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The Canadian Entomologist.

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TO OUR READERS.

A happy greeting to all. That the year may bring prosperity in its train to every one of our members is our sincere wish. We enter on our thirteenth year with confidence; long experience of the sincerity of the friendship and heartiness of support of our many friends and contributors in the past, inspires trust for the future—a trust which, we feel sure, will not prove misplaced. We want the cordial support of all to make our journal for 1881 more useful and more widely read than it has ever been before. We hope to hear from all our old friends and many new ones. Please send in your subscriptions promptly to the Secretary.

ENTOMOLOGY FOR BEGINNERS.

BY THE EDITOR.

The Indian Cetonia: Euryomia inda.

This is a stout, hairy beetle (fig. 1) which makes its appearance early in spring, usually towards the end of April or beginning of May, flying about in open fields and about the borders of woods, with a loud buzzing sound, resembling that of a bumble bee. It belongs to the flower beetles, most of whom live on pollen and the honey of flowers, and are fond of sweets.

Fig. 1.

This insect is of a brownish-gray color, dotted and spotted with blackish and thickly covered with short greenish-yellow hairs. It measures half an inch or more in length. During the summer it disappears, but a second brood comes out in the fall, usually during September, when they may be found feeding on the pollen of flowers and also upon the sweet sap of plants and trees. Not content with this, they attack our finest and most luscious fruits, eating their way into the richest ripening pears and burrowing into the finest peaches so deeply that only the tips of their bodies are visible, and in this way spoil-

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ing the fruit and inducing rapid decay. They also attack grapes and other sweet fruits.

The Abbot Sphinx: Thyreus Abbotii.

This very pretty Sphinx moth has in the past been very rarely met with in Canada; it seems, however, to be gradually spreading and becoming more common with us. It was first taken some years ago in the neighborhood of Hamilton, and is now reported as quite common there. This season a specimen has been captured in London by Mr. J. M. Denton, the first recorded capture in this neighborhood.

Fig. 2.

The caterpillar (see fig. 2) is found on the grape vine and also on the Virginia creeper (*Ampelopsis quinquefolia*), feeding on the leaves of both these vines. In color it varies from a dirty yellowish to a reddish-brown, marked transversely with fine black lines and longitudinally with patches of dark brown. There is also a dark line along each side. In place of the horn at the hinder extremity of the body which usually adorns the caterpillars belonging to the Sphinx family, there is in this instance nothing more than a polished knob or tubercle. The under side is paler than the upper, with a reddish tinge along the middle. The moth (fig. 2) is very pretty and adorned with soft rich colors. The fore wings are pale brown, variegated with brown of a deeper and richer shade. The hind wings are yellow with a broad blackish border; both wings are notched on the margin. There is but one brood of the moths each year, and they appear about the time the Lilacs are in bloom in the spring.

The winter is passed in the chrysalis state. When the larva is full grown it descends to the ground and constructs a rough cocoon on or near the surface in some sheltered spot, and within this changes to a blackish-brown chrysalis.

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OBSERVATIONS ON SEVERAL SPECIES OF AEGERIADÆ INHABITING THE VICINITY OF BUFFALO, N. Y.

BY D. S. KELLICOTT, BUFFALO, N. Y.

In this communication it is my purpose to record such of my observations on some local species of the "clear-wings" as it is deemed are real contributions to our knowledge of the group. I shall say more or less about the following species: *Aegeria tricincta*, *pini* n. s., *pictipes*, *acerni*, *pyri*, *tipuliformis*, *exitiosa* and *Trochilium denudatum*. There are other species known in our fauna, but these only have been encountered in the fields.

Aegeria tricincta Harris.

During June and July last I obtained several examples of this moth from larvæ secured in April. These larvæ were taken from branches, suckers and small trunks of *Populus candicans* growing on low lands along the Niagara below the city. The smaller ones were sometimes found in the sap-wood or just beneath the bark, but the larger ones were generally in the centre or pith of the stems; on the smaller stalks they cause considerable galls, quite as prominent as those upon the willow branches made by the larva of the Tortrix, very abundant in the same locality. These poplars are badly infested by the larvæ of *Saperda moesta*, and I am of the opinion that the moth places her eggs in the deserted burrows of the beetle, the young caterpillars thus easily gaining access to the wood, its home for at least a year. The swellings on the branches caused by the beetle become more enlarged by a second occupation. I have taken them from the stem just above ground, and from limbs of trees many feet high.

The larvæ, when taken, April 15, were of two distinct sizes, the larger measuring from .9 to 1.1 of an inch in length, the smaller .5 of an inch and less. The former appeared to increase but slightly before pupation. The color is dull white with a darker line along the dorsum; head quite strongly bilobed, light brown, jaws and clypeus black; the first ring smooth, slightly clouded with brown, two irregular oblique marks from posterior border outwards to front edge. Body somewhat attenuated toward either end; transverse wrinkles, especially on thoracic rings, well marked; in the small ones there is a slight medio-dorsal indenture; there are also lateral sub-stigmatal wrinkles. Stigmata elliptical, brown, last pair large,

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placed sub-dorsally and posteriorly. Above the anal feet, directed backwards, *there are two black chitinous teeth;* in the younger specimens they are more prominent and upturned. The scanty brown hairs arise from slight papillæ.

The larva before transforming prepares a way for final escape which it carefully guards by means of a silken membrane, reinforced by fragments of wood; it then lines its burrow with silk and spins a firm cocoon about itself.

The pupa is light brown. The clypeus is armed with a sharp wedge-shaped process, strengthened by ridges at its four angles and also by a median dorsal ridge. The abdominal rings are furnished, as usual, with two transverse rows of teeth, except the anal and pre-anal segments, which have but one row each. The terminal ring is obliquely truncated, bearing several teeth. Length .6 of an inch.

The moth is described by Harris in Silliman's Journal, Vol. 36, 310, as follows:

"Blue black; fore wings opaque; hind wings transparent, with the border, fringe and transverse line near the middle black; palpi at tip, collar, a spot on each shoulder, and three bands on the abdomen yellow; antennæ short, black; the four posterior tibiæ banded with orange; tarsi yellow tipped with black; tail flat with two longitudinal yellow lines. Expands from 1 to 1⅛ inch."

He says further that "this species seems to come near the European *asiliformis*, but the male has only two abdominal bands, while *asiliformis* male has five."

I am able to add the differences between the sexes and to mention some characteristic marks not referred to above. The male is considerably smaller; the antennæ are strongly pectinated to the apical portion, which is smooth and enlarged to nearly twice the diameter of the middle part; the processes of the joints are hairy with a long fascicle at the apex; the minute apical cone also bears a fascicle of hairs. The antennæ are blue black and scaled above, below pale bay. The abdomen has *four* yellow bands. No "longitudinal yellow lines in the tail." Both sexes have a conspicuous white spot bordering the eye in front; four small yellow spots on the upper part of the thorax; two below the base of fore wings, also a yellow line at the outer edges of the collar; the outer edge of the coxæ of the first pair of legs, also those of the second and third pairs are of the same color. The fore

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wings are more or less washed with red on the basal third. The second abdominal band alone appears on the ventral side; in front of it below is a yellow line.

I have not seen the European *asiliformis (bespiformis*, Br. Mus. Lists viii., 14), but have carefully compared our species with the descriptions of Stephens (Haust. vol. 1, 139) and Walker, and find the closest agreement, except perhaps in the coloration of the legs, and in size; *tricincta* is a little larger. Besides, Stephens says *asiliformis* is "occasionally taken on poplars near London in June."

I can not omit mentioning the very close mimicry of *tricincta* after certain wasps; it is so close that different persons to whom it was shown when alive pronounced it a wasp, and this, too, after being cautioned that a hasty conclusion might put reason to the hazard. This close mimicry results from their form and color, in general hue, abdominal bands, thoracic and head markings; also by their motions and attitudes, the buzzing of their wings, the alternate up and down strokes of their antennæ, the position of their wings at rest, their threatening attitude when disturbed, etc. These are often sufficient to deceive even a practiced eye.

AEGERIA PINI, n. s.

When studying the larval habits of *Pinipestis Zimmermani* in 1878–9, I met with the larva and pupa skins of two moths evidently different from the pine pest, yet having quite similar larval habits. During the past summer I succeeded in getting the moth of one of them; it is an Aegerian, as I think, undescribed, but I would not venture upon describing it had I only the imago; but as I am able to give mainly its history, and having done so much tramping and climbing for its sake that I have come to feel a proprietary right, I undertake to name and describe it as new. As its proposed name implies, the larva inhabits the Pine, boring under the bark and into the superficial layers of the wood. From the wounds thus made pitch exudes, which through the action of the larva and the warmth of the sun forms hemispherical masses over its burrows; in these masses the pupa cells are finally prepared and the inactive stage passed. The larva occurs more frequently than elsewhere just below a branch; sometimes about the border of a wound made by the axe or where a limb has been wrenched off by the wind; rarely in the axil of the branch. It appears to attack larger trees than the Zimmerman's pine pest, and more fre-

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quently occurs at considerable altitude. I have taken them thirty to forty feet from the ground. While they sometimes, perhaps as a rule, take advantage of the broken cortex, I have found them where it appeared that they had worked through the same into the soft layer.

I have found the larva in the following localities: Hastings Center, N. Y.; Portage, N. Y.; Buffalo, N. Y. (?); Point Abino, Ontario. At the first named place they were found in several instances numerous enough to seriously injure trees of moderate growth.*

I have taken the larvæ in autumn from .25 to .75 of an inch in length; they finally attain a length of 1 to 1.1 inch; diameter quite uniform, .18 of an inch. Color white; head light brown, flattened; first thoracic ring slightly clouded with brown, smooth; no trace of an anal shield; true legs scarcely colored, pro-legs prominent crowned with two rows of about eight hooks each. The brown hairs arise from papillæ, the base of each hair being surrounded by a brown annulation. The spiracles are but slightly elliptical, last pair large, placed sub-dorsally.

Before transforming they prepare a cell in the extruded pitch mingled with their *debris;* this they line with silk, but spin no other cocoon. While in their burrows they move through the soft pitch with impunity, but if removed from the same they soon die from the encumbrance of the hardening pitch adhering to them.

I have found the pupa the last of May; the moth appears from the middle to the end of June. It may be that others come in July and August, for I have found larvæ apparently full grown in July. On the 15th of July I brought to my rooms devoted to the rearing of insects, some blocks of wood containing such apparently mature larvæ, expecting them to complete their transformations in a few weeks at most; they are still in their pitch cells unchanged (Nov.) Is it a case of retarded development due to the drying of the bark and wood?

The pupa has a length of .73 of an inch. Color light brown with the extremities dark. Over the dorsal portion of the abdominal rings are the usual rows of teeth; those on the anterior margins scarcely extend below the spiracles. The clypeus is without a pointed process; the mediodorsal ridge of the thorax is unusually prominent.

* For definite direction to collectors I mention Mallory, a station near Hastings Center, on the Syracuse Northern Railway, where they may be found in force in pines thirty rods south from the station.

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When about to transform it bores through the pitch wall and escapes, leaving the pupa skin protruding.

The moth (female) expands 1.2 inch. Fore wings opaque; hind wings transparent. Color blue black as follows: fore wings, the clothed portions of hind wings, head, palpi, thorax, upper part of abdomen, antennæ and legs. The neck fringe and the sides of the collar are orange, also the ventral side of the abdomen and the tail fringes. The antennæ are long, slightly enlarged toward the end; there is a decided orange line on the under side of the antennæ for one-third their length; the tarsi are smoky. The male not seen.

Aegeria pictipes G and R.

I have found this species common enough at Buffalo wherever there are old plum trees. In some instances I have found it doing grave injury. It works also in the cherry trees. Its history has been given recently by Dr. J. S. Bailey (North Am. Ent., I, 17) with so much exactness that any further notice here seems unnecessary. I make mention, however, of finding *pictipes* in the wild black-cherry (*Prunus serotina*) and the wild red-cherry (*P. Pennsylvanica*) in June and July last, at Hastings Center, N. Y. Numerous larvæ and pupæ were taken from beneath the bark; imagines were taken flying about the trunks.

Aegeria acerni Clemens, likewise has been carefully described by Mr. C. V. Riley in the Mo. Ent. Rept., vi., 107. He says, however, that the pupa is unarmed, which is not the case with those obtained here, if "unarmed" refers either to the dorso-abdominal teeth or to the corneous pointed clypeus. The larvæ of this moth are annually doing much damage to the hard maples (*Acer saccharinum*), planted so generally in this city for shade; they are less destructive to the soft maple (*A. rubrum*). It appears that they seldom attack uninjured trees, but depend upon accidents to afford them opportunity to enter the inner bark and superficial wood: when once established they keep at the scar or wound year after year, thus preventing recovery and causing the trunks to become rough and unsightly; in many cases the trees are thus almost ruined. The moths appear most numerously from May 20th to June 15th. I have not been able to find, after patient search, this borer in our forest maples.

Exitiosa and *tipuliformis* are both sufficiently abundant in this vicinity to be destructive to peach tree and currant bush. I have imagines of the former which escaped late in September from chrysalids given me by Mr.

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C. D. Zimmerman, so the moth does appear from early summer until autumn. Mr. A. S. Fuller (Am. Ent. vol. 1, N. S., page 11) believes that "the grubs go a much greater distance from their burrows before passing into pupa state than is generally supposed." This from the fact that he found "at various times during the summer in almond trees larvae of all sizes and no pupae." I have rarely found their cocoons at any distance from their burrows, frequently in them covered with gum or bark. From observations on other species it appears that larvae apparently full grown at midsummer may hybernate without changing.

Pyri is a rare form here, so far as ascertained after search and inquiry.

Trochilium denudatum Harris is also rare; June 9th last I found one pupa skin, presumably of this species, protruding from an ash shade tree in this city, but no further evidence of its presence could be obtained. I have one moth taken here June 13th, which is doubtfully referred to this species.

NOTES ON COCCIDÆ.

BY J. HENRY COMSTOCK, WASHINGTON, D. C.

There occurs in certain orange groves in southern California a species of *Aspidiotus* which infests the bark, leaves and fruit of the orange and which from the extent of its ravages has created great alarm. This insect is popularly known by the fruit growers of that section as the red scale, although this name does not well describe its color. This species as yet occurs in only a few of the Californian orange groves, but is more to be feared than any other scale insect. I have conclusive evidence that it was introduced into that State from Australia. It is, I believe, as yet undescribed, and I offer the following diagnosis:

ASPIDIOTUS CITRI, n. sp. *Scale of the female.*—The scale of the female in outline is much flattened, varying in color from a light brownish gray to a bright reddish brown. In fresh specimens there is a white nipple-like prominence which is nearly central and is the remains of a tuft of cottony excretion, beneath which the first larval skin was shed; surrounding this and occupying one third of the diameter of the scale is a

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ring which is slightly darker than the remainder of the scale and indicates the position of the second larval moult.

Female.—The female is light yellow in color in the adolescent stages, becoming brownish as it reaches maturity. When fully developed the thorax extends backward in a large rounded lobe on each side, projecting beyond the extremity of the abdomen, giving the body a reniform shape.

Scale of male.—The scale of the male resembles that of the female, excepting that it is only one fourth as large, and the posterior side is prolonged into a flap which is quite thin.

Male.—The male is light yellow; thoracic band brown; eyes purplish black.

The species described by Mr. Ashmead in the November number of the American Entomologist under the name of *Chrysomphalus ficus* Riley MS. is simply a species of *Aspidiotus;* and is not that known as the red scale in California, as is indicated by Mr. Ashmead. Although I have carefully explored many orange groves both in Florida and California, and have had extensive correspondence with orange growers, I have been unable to find *Aspidiotus ficus* in the last named State, and only in a single grove in Florida. Here it was first observed by Mr. G. M. Holmes on some sour orange trees imported from Cuba. On sending specimens of it to a friend at Havana, I received others from that place and the information that it is a very common species in the public gardens of that city. The species can easily be distinguished from *Aspidiotus citri* by an examination of the scale alone, which is much darker, being sometimes almost black.

DESCRIPTION OF THE PREPARATORY STAGES OF PAPILIO PHILENOR, LINN.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Spherical; the surface much covered with a rough crust which rises to a summit, either small and pointed, or rather large and truncated; the sides of this crust irregularly melon-ribbed; color of surface russet, of the crust bright ferruginous. Duration of this stage 7 to 9 days.

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YOUNG LARVA—Length .08 inch; cylindrical, thickest anteriorly and tapering from 2 to 13; color ferruginous; marked longitudinally by many rows of low, conical, black tubercles, each of which sends out a black hair, and a few on the side on anterior segments several hairs; of these rows four are dorsal, two being close together on either side of dorsum, and they run from 3 to 13; three are lateral, the upper two being on upper and middle part of side, and running from 5 to 12; the lower, or infra-stigmatal row, from 2 to 12; besides these are two short rows, one of two small tubercles on segments 3 and 4, placed a little below dorsals, the other of three on 2, 3 and 4, between the lines of the upper two long rows; on 2 is a dorsal chitinous band, with five concolored tuberculous points and hairs on each side; feet black, pro-legs red-brown; head obovoid, a little depressed at top, shining black, with many black hairs.

As this stage proceeded a change in the appearance of the larva took place, and shortly before the next moult this reached its height. The tubercles of the two outermost of the dorsal rows became prominent and conical, the tops crowned by the black shields which at first had been at the surface of the body. Seen lengthwise these two rows now formed elevated, sharp ridges. The tubercles of the two inner dorsal rows rose scarcely if any at all, and were almost within the bases of the other rows and stood a little in advance of them. The tubercles of the second short row on 2, 3, 4 became still more prominent, that on 2 especially, and it was turned forward so that its end was even with the front of the head. At same time one tubercle of the upper lateral row, viz., that on 5, and one of middle row, viz., that on 6, also became prominent, and these five all gave out several divergent hairs from their summits; so the remainder of second lateral row gave out three hairs, the other tubercles but one hair each. To first moult from 4 to 9 days according to the season.

After 1st Moult—Length .12 inch, same general shape; color red-brown; at the outer edge of dorsal area on either side, corresponding to outer dorsal row of first stage, is a row of fleshy appendages, one to each segment from 3 to 13; these are thick, tapering, bluntly rounded at top, and from base up are beset with short black hairs; those on 3, 4, 5 are longest, next those on 11 to 13, the others are short; on the lower part of side on 2 to 4 and on 6 is a demi-row of similar appendages, the two anterior ones longer than any dorsal, and the pair on 2 turned forward so that the tips are about even with front of head; on 5, a little above the line above this demi-row, is another but very short tubercle; over the legs

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from 7 to 10 and continued to 11 and 12 is another demi-row, all very short and pointing downward; (this arrangement of the appendages continues to last larval stage); the dorsals are reddish, with a fiery glow, the others are color of body; 2 has a chitinous patch with fine tubercles and hairs; under side darker brown; head subcordate, flattened frontally, surface black, shining, much covered with fine and short black hairs. Duration of this stage 3 to 4 days.

After 2nd Moult—Length .22 inch; shape much as before, the segments well rounded, each having one or two vertical depressions on the side; color chocolate-brown, with a reddish tint; the appendages on side of 2 much elongated, measuring .04 inch, and as the stage progresses reaching .08 in.; the dorsals on 3 to 5 and 11 to 13 are longest, subconic; more or less of these dorsals are fiery red, sometimes a single pair, and so to four or five pairs, and the others have a dull red hue; head as before. To next moult 3 to 4 days.

After 3rd Moult—Length .6 inch; color silky black-brown; the dorsal appendages from 5 to 11 are bright red; the front of the ridge on 2 is of same red; the dorsals on 11 and 12 are curved forward; the long side spur on 2 is now .16 inch, tapering and flexible. To next moult 4 to 5 days.

After 4th Moult—Length .8 inch; color now silky-black; as the stage proceeds it changes to dark brown, and loses much of its gloss. At about five days after the moult the larva reaches maturity.

MATURE LARVA—Length at rest 1.6 in., in motion 1.8 inch; color uniform black-brown; shape cylindrical, thickest at 4 and 5; each segment curved, the highest point being in the line of the appendages, or a little back of the middle of the segment; furnished with several rows of fleshy tapering appendages, bluntly rounded at top, and disposed as before described under the first moult; these are mostly concolored with the body, and are thickly beset with short black hairs; the dorsals on 3 to 5 are moderately long, on 11 to 13 long, and the two last are bent forward; the rest are short; from 3 to 10 they are bright yellow or sometimes orange-red; of the anterior demi-row, the one on 2 measures about .34 inch and is slender, tapering, flexible, and is moved much like an antenna; the one on 3 is scarcely half as long as the other, and the two on 4 and 6 are shorter still and equal; on 5 resembles the short dorsals and is colored like them, either yellow or red; those of the posterior and lower demi-row are bent down, and when the larva is at rest have their

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extremities even with the claspers; segment 2 is broad, covered dorsally by a chitinous patch which is surrounded mostly by a fleshy ridge; on its anterior side is a yellow or red patch; surface of body smooth, but with one or two vertical creases to each segment and some depressions near the summit; under side brown; feet black, legs brown; head sub-cordate, flattened in front, the depression at top slight, the vertices not being much elevated; color dull black, much covered with short black hairs. At 8 days from 4th moult the larva suspended, and in two days thereafter pupated (in August).

CHRYSALIS—Length 1.1 inch; the abdomen anteriorly very broad, measuring .34 inch; the thoracic segments narrow; bent in a double curve, the head and thorax being thrown back, the abdomen arched and turned down at end; head case much produced, narrow, widening at top, compressed transversely and bevelled roundly and equally to a sharp transverse ridge, the top of which is a little incurved; the sides at top triangular and at the edges ridged; at base of head case on either side is a small pyramidal projection; mesonotum high, rounded, and having on the summit an elevated, three-cornered process, rounded bluntly at top, the sides excavated so as to form three sharp ridges, two across and one, on upper side, in medio-dorsal line; the wing cases flaring, especially on lower half, the middle being depressed; on the abdomen are two sub-dorsal ridges, on each of three segments produced to a high thin circular appendage; on either side of abdomen a low ridge; color variable, being either wood brown, finely veined or reticulated with darker, the ventral side of uniform hue; the top of head case, mesonotum and dorsal side of abdomen being a little yellowish, all the ridges being darker; at base of head case on dorsal side, and along the edges of the wing cases, is a sprinkling of small deep yellow spots and points. Or the general color is green, which prevails over the whole ventral side, the ridges everywhere being of a darker green; the mesonotum yellow-green, and all below to end of abdomen light yellow; a yellow patch at base of head case, which sometimes includes a crimson spot; and sometimes, on either side of mesonotum, is a small round crimson spot. Duration of this stage 15 days.

Philenor is a very common butterfly in this region, to be seen from early spring to frost, in successive broods, and yet I rarely find its caterpillar. Aristolochia, the vine upon which it feeds, is not rare in our forests, but is confined to them. Undoubtedly the caterpillar feeds on

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some other plant, as Mr. Mead observed a female ovipositing on the leaves of a slender, low-growing vine in a thicket near my house, some years ago. We neglected at the time to ascertain the name of this vine and I have since been unable to re-discover it, or to find any plant except Aristolochia upon which the larvæ in confinement would feed. Abbot figures Aristolochia *serpentaria* as the food plant of this species, and Dr. Boisduval says the butterfly is found especially where A. *serpentaria* grows. The larvæ feed upon A. *sipho* as readily. An old and very large vine of this species covered the front of the house in which I formerly resided at Newburgh, N. Y., and every year was nearly denuded of its leaves by caterpillars of *Philenor*. How much further north the butterfly lives I am not advised, but to the south and southwest, and on the Pacific coast, it is abundant. So also throughout tropical America and in the West Indies. The eggs are laid in one or two rows of from five to ten in the row, on the under side of the leaves, and are not close together, but separated by narrow spaces. The young larvæ betake themselves to the edge of the leaf, and ranging themselves at right angles to this, side by side, feed after the manner of the large Bombycidæ. No other species of N. American Papilio with whose early stages I am acquainted has this gregarious habit. This continues till they are half grown, when they separate. They are very active in their movements, far more so than any other of our Papilio larvæ, and can travel with great rapidity, and when in motion constantly vibrate their long, flexible, antennæ-like appendages. I have found them somewhat cannibalistic in their propensities, devouring each other at times, when the lack of proper food was not the occasion of it.

I have been in error for several years as to the number of larval moults of *Philenor*, and several times have spoken of the species as exceptional in this respect—as having five moults, when all our other Papilios have but four. And suspecting a mistake, I have taken great care to ascertain the fact the past season. There are but four moults, as hereinbefore described. The figure of the larva of *Philenor* in Abbot is fairly correct, but the chrysalis is much out of drawing. Boisduval and LeConte profess to have figured after Abbot, but the larva cannot have been copied from the Insects of Georgia. It is absurdly wrong. There is no sign of the demi-row of lateral appendages, and the long pair on segment 2, which should form part of this row, appear to come from the dorsum, and look like the prongs of a thorn-locust tree. There is also given a lateral row of red knobs like those on dorsum, and which have

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no existence in nature. The chrysalis also is badly done, and instead of the broad bevelled ridge at top of head case, we see a square flat-topped process, much like a wooden plug driven into the head.

NORTH AMERICAN MOTHS.

BY A. R. GROTE.

(Continued from Page 258, vol. xii.)

Graphiphora agrotiformis, n. s.

♀. This form reminds one of *Agrotis collaris* or *versipellis*. Eyes hairy; tibiæ unarmed; tuftings obsolete. Fore wings blackish brown to the continuous, black, upright, uneven subterminal line; beyond with the fringes brownish. Median lines geminate, faint. Orbicular round, paler than the wing; reniform moderate, outwardly excavate, upright, pale-ringed with dark centre; the cell between the spots black-shaded; the stigmata are comparatively small. No trace of the claviform. Hind wings pale brownish fuscous, concolorous; fringes a little lighter and more reddish. Beneath secondaries paler, with discal dot and uneven exterior line; fore wings dark fuscous to terminal space, which is pale with the fringes dark. Head and thorax like the fore wings; collar a little paler. Body rather slender; costa of primaries a little depressed centrally. Colorado; expands 34 mil. Differs from the described species quite strongly; from *Mamestra* by the untufted body parts.

Heliophila oxygala, n. s.

Allied to *pallens*. Fore wings light yellowish ochrey; the interspaces beyond the cell and below the median vein indeterminately shaded with blackish. The veins paler; a small black dot at the end of the cell alongside of the median vein. The outer line reduced to a small black dot on vein 2 and vein 5. Fringes concolorous. Hind wings blackish fuscous, a little paler at base; fringes pale. Beneath both wings shaded with fuscous, leaving the costa of primaries and the fringes pale. Breast shaded with fuscous; thorax and abdomen yellowish ochrey. This species is more yellowish than *pallens*, with the fore wings shaded with

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blackish. Eyes hairy; clypeus smooth. Expands 32 mil. Colorado. One specimen in Mr. Tepper's collection, one ♂ in my own.

Under the name *obusta*, I believe that Gueneé has described a form of *pseudargyria* in which the primaries are suffused with *red*.

Heliophila flabilis, n. s.

♂. Very pale ochrey or straw color shaded with fuscous. The pale longitudinal shades extend along the cell over the interspace between veins 5 and 6 nearly to the margin; a short pale shade on the interspace above and extending nearer to the margin. From the base a wide submesial pale shading extends outwardly to the margin. A black dot marks the reniform at median vein; an extra-mesial row of dots on the nervules, not prominent. The veins are indistinctly paler. The darkest portion of the wing is along the median vein, and a fine black streak runs along the interspace between veins 4 and 5. Hind wings whitish, vaguely soiled with fuscous exteriorly. Thorax concolorous with primaries; no lines on the collar. Beneath without marks. This species recalls in ornamentation *lapidaria*, but is more diffusely shaded; the outer line of spots more numerous, the hind wings darker, the body more slender. Eyes hairy; clypeus smooth. Long Island, near the sea shore, in May; Mr. Tepper. Expands 33 mil.

Heliophila farcta, n. s.

♂. Allied to *adjuta* and *lapidaria*, but much stouter. Fore wings unicolorous pale ochrey with a warm or reddish tinge and without longitudinal shadings. Median vein paler. A dot on vein 2 and one on vein 5 indicate the extra mesial line. A small faint dark shade subterminally about vein 5 opposite the cell. Hind wings white with slightly ochrey fringes; no marks above and beneath. Collar lined. Head and thorax concolorous with primaries; femora darker within. Eyes hairy. Length of primary 19 mil. California, Mr. Hy. Edwards, No. 168.

The following is a list of the North American species of *Tarache* (Acontia), as far as known to me. I have seen the type of *obatra* Morrison; it appeared to me to belong to *Spragueia*. The new variety *virginalis* differs from the type by the absence of the subterminal blackish shading on the primaries.

1. *crustaria* Morrison, Proc. Ac. N. S. Phil., 70, 1875. Colorado; Nebraska.

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2. *flavipennis* Grote, Bull. B. S. N. S., 1, 153. California; Oregon.
3. *aprica* Hubn. 371; Guen. Noct. 2, 219; Var. *biplaga* Guen., Noct. 2, 218. Southern States.
4. *abdominalis* Grote, Can. Ent., 9, 157. Texas.
5. *lanceolata* Grote, Can. Ent., 11, 198. Texas.
6. *angustipennis* Grote, Proc. Ac. N. S. Phil., 426, 1875. Texas; Colorado; Calif.
7. *sutrix* Grote, Can. Ent., 12, 154. Colorado; Nevada.
8. *tenuicula* Morrison, Proc. B. S. N. H., 218, 1875. Texas.
9. *erastrioides* Guen., Noct. 2, 218. Canada; Eastern and Middle States.
10. *candefacta* Hubn., Zutr. 587–8. Canada; U. S. east of Rocky Mts.
11. * *debilis* Walk., C. B. M., 786. Texas. Var. praec.?
12. † *arizonae* Hy. Edw., Proc. Cal. Acad. 1878. Arizona. Coll. Hy. Edw.
13. *elegantula* Harvey, Can. Ent., 8, 55; *Tar. semiopaca* Grote, Bull. U. S. Geol. Surv. 4, 182. Montana; Nevada.
14. *binocula* Grote, Can. Ent. 7, 224. Var. *virginalis* Grote. Texas.
15. *cretata* G. & R., Trans. Am. Ent. Soc. 3, 181, pl. 2, fig. 78. Texas.
16. *lactipennis* Harvey, Can. Ent. 7, 135; Bull. B. S. N. S. 3, 10, pl. 2, fig. 3. Texas.
17. *delecta* Walk., C. B. M., 799; *metallica* Grote, Proc. Ent. Soc. Phil. 4, 321, pl. 2, fig. 7. Southern States.
18. *terminimaculata* Grote, Bull. B. S. N. S. 1, 153. Eastern and Middle States.

Staudinger enumerates six species of *Tarache (Acontia)* in the European fauna. As above cited we have eighteen. Of these, two, Nos. 12 and 13, were originally described under *Thalpochares;* one of them I have not been able to examine critically *(Arizonae).* I have seen the type in Mr. Edwards' collection; it is frail and small, in ornamentation recalling *elegantula,* of which I have been able only recently to see the type also in Mr. Edwards' collection. Both these species need neurational study to determine positively their generic location; of *elegantula* I have only a single perfect individual, the type of *semiopaca,* and cannot sacrifice the specimen. Our fauna contains many handsome and noteworthy species. Foremost among these are *delecta,* which resembles the species of *Eudryas* in color and *cretata* and *lactipennis,* which recall *Ciris Wilsonii.*

* From recollection of the type Mr. Walker's *debilis* is a variety of *candefacta.*

† This and the following were described under *Thalpochares.*

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Hyblaea puera Fabr.

From a specimen shown me by Mr. Neumoegen as Mr. Strecker's new genus *Aenigma*, with its "very large number of subcostal nervules," I infer that Mr. Strecker has re-described this Fabrician genus and species, which latter is variable and enjoys a wide geographical range. It is also very probable that Mr. Strecker's new "Cosmia" from Florida, described in Proc. A. N. S. Phil., is the typical southern ♀ form of the Bombycid, *Hyparpax aurora.*

Botis dapalis, n. s.

Fore wings with dusky gray median space; the rest of the wing brownish. An arcuate dark brown anterior line; posterior line similarly colored, sinuate, followed by a vivid white shade at costa. A brown dot in the place of the orbicular; a small black streak in the place of the reniform. Terminal space gray. A black dotted line followed by a gray line before the brownish fringes. Hind wings crimson red with a black extra discal mark, the fragment of an extra mesial line. Edge of the wing and internal margin black shaded. Fringes silky, long, brownish, tipped with reddish. Beneath fore wings red with the discal marks repeated and the exterior line, followed by the white costal shade, repeated. Hind wings yellow, shaded with red, with a red discal dot and extra mesial jagged line; a subterminal line marked at costa. Fringes brownish, long, silky, stained with red. Body parts dark brown, paler, reddish beneath; palpi reddish at the sides. *Expanse* 18 mil. California, Mr. Hy. Edwards, No. 3,023. A very distinct species belonging to the *subsequalis* group.

CORRESPONDENCE.

CONCERNING CHRYSOPHANUS NAIS, EDW.

DEAR SIR,—

This species was described from defective and scanty material, brought in from Arizona. As it has recently been taken in numbers in So. Colorado and New Mexico by Mr. B. Neumoegen and others, we are able to see that it belongs to the Erycinidæ, and its habits are reported to be like those of Lemonias Virgulti and allies. I enclosed a pair to Mr. A. G. Butler, British Museum, and he replies 22nd Nov.: "I do not wonder at your describing the little butterfly as a Chrysophanus; it was a most

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natural mistake considering that the coloring and pattern are quite like that genus, and quite unlike the members of the genus to which it appears to belong. In structure it agrees best with Apodemia (I might say it agrees altogether), but the pattern of the under surface is not like any member of that genus known to me, being more like the arrangement found in Echenais. If color therefore can be called a structural character, the species belongs to no known genus, but as I do not consider this to be the case, I should certainly refer it to Apodemia."

Coalburgh, W. Va., Dec. 9, 1880. W. H. EDWARDS.

ON HYPHANTRIA TEXTOR.

DEAR SIR,—

Hyphantria textor (Harris) made its appearance in this locality on May 10th, and from that date to the 13th I captured 53 ♂ examples and 10 ♀.

On June 17th the second brood appeared, and in three days I took 41 ♂ and 10 ♀.

Unfortunately, at the time of the appearance of the third brood, it commenced raining, and for two weeks, almost every day or evening, we had heavy showers, nearly exterminating lepidoptera.

In the first brood every male had the black spots on the primaries, from a single spot on each wing to almost covered, and in some examples a spot on the secondaries. In the second brood all were white, not an example with the least trace of a mark, the females in both broods entirely white. I anxiously waited for the third brood, but for reasons above, did not see a single specimen. My object was this :—Has the first brood or that which remains over winter only, the black spots? or does *H. textor* alternate? Will some of your readers please answer the above questions through your valuable journal.

August 3rd, 1880. JAMES S. JOHNSON, Frankford, Penn'a.

DEAR SIR,—

In connection with Mr. Fletcher's interesting article on *Calosoma*, I send you my experience of *scrutator*. On 11th June I left Hamilton for Long Point. I had half a day to spend at Port Dover before the boat left. About noon a strong breeze sprung up from the S. W., which drove the waves up the shore. I took a stroll along the beach, and had not gone far when I saw a greenback just landed, making rapid strides with

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his long legs away from the water, and I seized my first living *scrutator*. I took several of them that afternoon alive, some of them simply that and nothing more. At Long Point the evidence of what had been was unmistakable; the water lines of various storms of different forces were marked with bands of green wing-covers. I was too late for the harvest, very few coming ashore while I was there. When sugaring for moths we took from 2 to 5 every night, and one night 16. A large gauze-winged fly was attracted in great numbers to the sugar, and the *scrutator* was attracted by them, for in almost every instance we took them with one of these in their jaws. When seized they would drench the fingers with an acrid fluid of the most offensive odor; it was very volatile, drying rapidly with a sensation like alcohol. In one instance I took one from under a board on the beach, and in blowing off the sand that adhered to it some of the fluid struck my lip; it burned for an instant sharply. The odor from them leaves in a very short time. Does it not seem strange they should remain so scarce in the country when they are landed in such numbers on our shores alive? A friend, Mr. A. H. Kilman, of Ridgeway, writes me that they came ashore this spring after a south-west storm in hundreds, dead and alive. And we may suppose it to be about the same along the whole north shore of Lake Erie, and yet I know of but three taken in the neighborhood of Hamilton in 20 years. J. ALSTON MOFFAT.

Hamilton, Ont., July 9th, 1880.

ARBOREAL AUSCULTATION.

DEAR SIR,—

Some time ago, while visiting the Dean and Williams Gold Mine, in the township of Marmora, I was interested in observing the proceedings of some woodpeckers which resorted to some half-dead pine trees in front of my room window. I remarked that after alighting they would run upwards in a zigzag way, stopping occasionally, and applying the side of their heads to the tree, evidently listening for the noise made by a grub while gnawing the wood. Suddenly a bird would begin to dig into the bark, the rapid strokes of its powerful bill making the chips fly faster than a lumberman's axe. On one occasion, by the aid of an opera-glass, I saw one fellow transfer something large and white from the cavity he had excavated to the interior of his craw, but the quickness of the action prevented me from ascertaining precisely what it was.

Thinking of this, it has occurred to me that the presence of a

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"borer" in a fruit or other tree might be ascertained in the same manner by the use of a tube of wood or tin-plate formed like a stethoscope or ear-trumpet; by applying the wide end to the tree and the small end to the ear, the exact locality of the grub could be determined, when the application of a stout brad-awl or small gimlet would put an end at once to his life and his depredations without material injury to the tree.

JAMES T. BELL.

NOTE ON CHRYSOMELA JUNCTA, C. 10-LINEATA AND CARYOBORUS ARTHRITICUS.

DEAR SIR,—

During last Aug. and Sept. *Chrysomela juncta* has been more abundant than I have ever before seen it in this vicinity, and with larvæ was feeding on the leaves of *Solanum carolinense*, in company with *Chrysomela 10-lineata* and *larvæ*. The larva of *juncta* differs from *10-lineata* in being stouter and with the head larger. The color is dirty white. They are readily distinguishable apart. I took in the sexual act a male of *juncta* and female of *10-lineata*, and Mr. Siewers, of Newport, also observed the two species in intercourse. In the neighboring potato fields were thousands of *10-lineata*, but no *juncta*. Specimens killed in cyanide and pinned immediately after death all turned black in drying; to get a few good specimens I flexed the abdomen down, cut an incision along the top and removed the soft parts, put in a amall quantity of arsenic and filled the cavity with cotton—getting as a result bright and beautiful specimens.

A friend in Fla. writes, saying: "I send a box of seed of the 'Cabbage' tree. I gathered them and put them away, and when I opened the box I found a bug in every seed. What are they?" The seeds, about 100, are of the *Sabal* palmetto; out of the entire lot only two or three did not contain a beetle, *Caryoborus arthriticus* Fab. The entire inside portion of the seed being eaten out and the insect filling the cavity, a round cap had been formed—by the larva, perhaps, cutting a ring through to the external skin of the seed on the inside, leaving it so that a push would burst it outward. The cap was in many cases burst off, and in all cases the insect was presented towards the opening tail foremost; all were dead. Is this one of the uses of the powerful posterior legs of this species, to burst the skin of the seed and thus get out?

CHAS. DURY, Avondale, Ham. Co., O.

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The Canadian Entomologist.

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ON THE EARLY STAGES OF PLUSIA PRECATIONIS, GUENEE.

BY D. W. COQUILLETT, WOODSTOCK, ILL.

EGG.—Flattened-globular or button-shaped, sometimes with an impressed spot in the centre of the upper side; upper part grooved, grooves narrow, interspaces roughened; milky white; transverse diameter about ½ m. m.

LARVA.—*First stage:* Body deep green, two dorsal, a subdorsal and stigmatal white line, the latter the most distinct; piliferous spots green, usually tipped with black, each bearing a short black hair; venter deep green, unmarked; head pale green. Provided with only 12 legs.

Second stage: Same as first, and with an indistinct whitish line on the dorsal space; subdorsal space usually tinged with black.

Third and last stage: Same as second; body robust, tapering anteriorly; length at maturity 1¼ inches.

CHRYSALIS.—Of the usual shape, blackish brown, terminates behind in a short, thick, cylindrical projection, rounded behind and tipped with one or two small hooks; antennæ and leg cases project beyond the wing cases in the form of a small bulb; length from 13 to 15 m. m.

In the larvæ of this brood I observed only two moults, and if there is a greater number of moults than this they probably occur prior to the first moult mentioned above. Just before moulting the larvæ left their food and collected on the ceiling of their cage.

In some of the captured larvæ which I have reared the piliferous spots were sometimes entirely black, or had a black basal annulation; sometimes the head was surrounded with black, or had a black streak on each side; in many of them all of the white lines, except the stigmatal, were obsolete.

On the 17th of May, 1880, I enclosed a female *precationis* in one of my breeding-boxes in which some grass, clover and plantain were growing. In the afternoon of the next day she laid about 50 eggs, placing them singly, or in small rows or patches, on both the upper and under sides of

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the grass and plantain leaves, seldom placing more than five eggs in one cluster. Shortly after hatching the larvæ ate the parenchyma of the blades of grass, leaving the veins untouched; after increasing somewhat in size they fed upon the plantain leaves. The first larva of this brood began spinning its cocoon on the evening of June 16; it became a chrysalis June 19, disclosing the imago June 28. The chrysalis could easily be seen through the thin cocoon. When this larva began spinning its cocoon the other larvæ of the same brood, hatched out at about the same time and reared under precisely similar conditions, were of all sizes from those only one-half grown to those nearly full grown. As they appeared to be costive, I supposed that it was caused by a lack of water; accordingly I wet a few leaves and fed them to the larvæ, shortly after which they were taken with a violent scouring, which so reduced them that all but one died; this one spun its cocoon and went on to chrysalis, but died before producing the imago.

On the 6th of July following I obtained another laying of eggs, and the larvæ from these showed the same variation in size as those of the first brood. When some of them became nearly full grown they were attacked with a disease which caused them in a short time to turn black; if handled after death the skin readily broke, showing the interior to be filled with a blackish liquid. As soon as this disease made its appearance I removed the healthy larvæ to new breeding-cages, but they all finally died of this disease.

On the 23rd of April, 1879, I obtained a larva of this species which spun its cocoon the next day, disclosing the imago May 20; the earliness of the date precludes the possibility of its having issued from the egg the same season. It was taken while feeding upon dandelion leaves; I have taken other larvæ of this species upon the leaves of burdock and plantain. Prof. G. H. French states* that they also feed upon the leaves of the thistle and hollyhock, but I have never taken them upon either of these plants. I have seen caterpillars which did not differ materially from those of *precationis* feeding upon cabbage leaves, and the *precationis* larvæ in my breeding-cages fed readily upon these leaves. As there is so much difference in coming to maturity among the larvæ of the same brood, it is evident that no given number of broods are reared in one season by all of the members of this species; four broods in a season seem to be the maximum number, while the average number is probably three.

* Seventh Report St. Ent. Ill., p. 229.

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In the afternoon of June 29, 1880, I saw a female *precationis* depositing her eggs; these she placed singly on the leaves of grass and low weeds, seeming to have no preference for any particular species of plant. This diurnal habit of the moth seems to be a well established one, for I have frequently seen them taking food from clover blossoms in the day time, and the moth from which I obtained the first laying of eggs was captured while hovering around lilac blossoms at mid-day when the sun was shining brightly. In vol. xi., page 108, of the CANADIAN ENTOMOLOGIST, Mr. W. L. Devereaux also records the capture of a *precationis* on the 1st of June "at lilac blossoms in the day time."

Precationis is very abundant in this locality, frequenting clover meadows in company with *Drasteria erechtea* and *Hypena scabra*. When flushed it flies a short distance with a graceful, undulating motion, and then alights in plain view without any attempt at concealing itself; after alighting it sometimes elevates its wings and vibrates them very rapidly.

Below is given in a tabular form the time occupied by this species in its different stages:

From deposition of egg to hatching.....	4 to 6	days.
" hatching to first moult.....	14	"
" first to second moult.....	3	"
" second moult to spinning cocoon..	5	"
" spinning cocoon to chrysalis.....	3	"
" chrysalis to imago.....	9 to 23	"

NOTES ON SOME NOCTUID LARVÆ.

BY. G. H. FRENCH, CARBONDALE, ILL.

Mamestra trifolii, Esp.

Length when full grown 1.10 inches. In shape and appearance very much like the larvæ of *Agrotis lubricans*. Color uniform grass green marked as follows: a rather broad substigmatal line of creamy white, having at times a slightly pinkish tinge; a dorsal line of dark green. There is no trace of a subdorsal line except that the place of that line is a very little lighter on the first three joints when the larva is crawling. Stigmata narrowly edged with black. Head rather small, a little paler than the body. Piliferous spots very small.

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Two of these were found in my garden hid among some weeds, June 29, 1880. After putting them in the rearing box one died, the other changed to a chrysalis July 5th, and produced the imago July 18th.

Prodenia lineatella Harvey.

Length 1.35 inches. Shape of body cylindrical, very much like the larvæ of *Agrotis*. Dorsal, subdorsal and substigmatal lines, and a line in the middle of subdorsal space, pinkish lilac. In the dorsal space there are, first a series of oval dark brownish drab spots, the broadest part occupying the centre of each joint, the several spots connecting with each other at the union of the joints. In width they extend two thirds of the distance from the dorsal to the subdorsal lines. On the subdorsal rests a series of either triangular or somewhat oval velvety black spots, one to each joint on each side of the body. These spots extend inward half way to the dorsal line, thus encroaching somewhat upon the drab spots. At the base of each black spot, next the subdorsal line, is a narrow, bright yellow, semi-elliptical spot. The rest of the dorsal space is gray irregularly striped with fine white. The upper half of subdorsal space is pinkish gray irregularly striped with fine black; the lower half black, similarly striped with fine light lines. Substigmatal space and venter carneous gray, the first spotted with white. The head and cervical shield are black, the inverted Y white.

The single larva from which the above description was taken was found in my garden August 20th, 1880, in a bed of salsify. While in confinement it ate readily of the leaves of salsify, peach and raspberry. August 25th it disappeared for pupation, and the imago emerged September 11th.

Leucania pseudargyria Guen.

Length one inch. General color fleshy brown, sprinkled over with dark brown. Dorsal line narrow, of general ground color; this and the subdorsal and substigmatal distinguished by not being sprinkled with brown. The dorsal space dark brown, composed of dark brown dots finely sprinkled over the surface. About midway this is partially separated as though forming two dark lines. There is a slight massing of these brown dots from the posterior part of the joint, near the dorsal line, outward forming an indistinct V. Subdorsal space much like the dorsal only lighter. Substigmatal space with few dots, a brown patch at the

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base of each pro-leg. Head of the same general color as the body, mottled with brown. Cervical shield dark brown, small. Piliferous spots small, brown.

Two of these were found, one of which died from the effects of parasites. The other, found March 8th, changed to a chrysalis March 21st, on the top of the dirt in its box, under some dry grass, without a cocoon. The moth emerged April 18th. They were taken in situations indicating that grass constituted their food, and ate only that while in confinement.

Mr. Caulfield has given us a description of this larva in Vol. 6, page 132 of the Can. Ent., but as my specimens varied some from his, I thought it well to give what I have above.

ON THE EARLY STAGES OF GRACILARIA STIGMATELLA, Fabr.

BY V. T. CHAMBERS, COVINGTON, KY.

As elsewhere stated, the species formerly described by me as *Gracilaria purpuriella* is *G. stigmatella* Fabr. In the Natural History of the Tineina, vol. viii., p. 35, Mr. Stainton gives the following account of it: "The larva feeds in and upon willows, sallows and poplars. On the white poplar I have had an opportunity of observing the mine of the young larva, which is a *small blotch not very unlike the mine of a Lithocolletis larva.* (Italics my own.) As soon as it quits this mine, which it does at an early period of life, it rolls up a piece of the tip or edge of the leaf in a conical form, and it feeds on the interior of this cone, eating half through the substance of the leaf; as one of the cones does not afford sufficient sustenance for the larva during its whole existence, it treats in succession several leaves in this fashion, and the deserted cones always contain a considerable amount of excrement. On the white poplar the conical form of the habitation is not so marked, and sometimes it rolls over a piece of the edge of the leaf. When the larva is quite full fed it turns down a corner of a leaf, or else fixes itself straight over the midrib, and there spins its tough but glossy-looking cocoon, from which in a *few weeks* (italics mine) the perfect insect emerges." This is the most complete account of the larva of this species that I have seen; and I quote

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it that the reader may compare it with my own observations as hereinafter detailed. The only point in which my observations differ essentially from those of Mr. Stainton, is that I find the duration of the pupa state as hereinafter shown to be only one week, instead of "a few weeks," but this may perhaps be accounted for by difference of season or temperature.

Partial life histories of many species of Tineids have been heretofore published, but very few full or detailed ones; and the only attempt at a complete history of any species of *Gracilaria* that I have met, is Mr. Healy's account of the larva of *G. syringella*, in the Entomologist's Monthly Magazine, v. iv., p. 150, *et seq.*, and unfortunately I have seen only the last two parts of it; and therefore I do not know what account he gives of the structure of the mouth parts, nor of the ecdysis in the earlier stages of the species. Mr. Healy states that *syringella* frequently goes under the ground to pupate, and in this respect it appears to be singular in this genus, but probably it only does this in confinement. His account of its manner of rolling and fastening the leaf and of making its cocoon is characteristic, I think, of the larger species of this genus—the true *Gracilariæ*. I infer from Mr. Healy's concluding remarks (*loc. cit.* pp. 176 and 197) that *syringella* passes through only four larval stages. Thus he states that when the larva first leaves the mine "it crawls to the under side of another leaf, the tip of which it rolls downward;" that "after a few days residence in the rolled leaf the larva moults for the second time." My observations on *stigmatella* and other species of the genus lead me to the conclusion that there are two moults in the mine, and that the moult which Mr. Healy calls the second is really the third; and that the first stage, and first moult of *syringella* (in which it has trophi of what I have elsewhere denominated the "first form," and membranous thoracic feet) escaped his observation. Mr. Healy only mentions two other moults later than that which he calls the second, making according to his account only four larval stages. But the species whose larval history I have observed (*stigmatella*, *rhoifoliella*, *robiniella* and *salicifoliella*) all have five larval stages; and in the first stage all have the trophi and feet as above stated, so that I think it probable that the first moult, which takes place when the larva is not more than 85 m. m. long, escaped Mr. Healy's observation. But as above stated, I have not seen the first part of his paper.

Mr. Stainton mentions a slight difference between the habits of *stigmatella* when found on "white poplar" and when found on willows; that is, the

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cone was more regular on the latter. I have observed the same difference between those found on willows and those found on silver-leaf poplars and cottonwoods. I attribute it to the size and stiffness of the poplar leaves. I have never met with the larva on the weeping willow. But to return to its life history.

On the morning of Saturday, July 10, I found on a leaf of cottonwood (*Populus monilifera*) a narrow white line about one-half inch long, which was at once recognized as that of this species in a very early stage. On holding the leaf up in the sunlight the larva was visible in the mine; it was flat, had membraneous, unarticulated and unarmed thoracic legs and mouth parts of the "first form," with the head and thoracic segments a little wider than the abdominal segments, and looked very much like a *Lithocolletis* larva of the flat group in the same stage. (Nevertheless a practiced eye will distinguish a *Lithocolletis* from a *Gracilaria* larva even in this stage.) It was less than 8 m. m. long, and as I infer from many observations on these small larvæ and their mines, it was but a few hours, probably about twelve hours from the egg. It extended the mine until it was about 1.9 m. m. in length, and scarcely wider than the body of the larva, and the mine looked like a portion of a *Phyllocnistis* mine; then it made a few digitate lateral branches, and the mine resembled a young mine of *Gracilaria robiniella* in locust leaves; then it connected these branches so that the mine became an irregular parallelogram about 1.9 m. m. long and 6 m. m. wide; and now, as stated by Mr. Stainton, the mine was not unlike a young *Lithocolletis* mine, or a white blister on the leaf. Like all larvæ with trophi of the first form, it ate only a layer of cells beneath the cuticle, not burrowing down into the pareuchyma. On Tuesday evening, July 13th, about three to three and one-half days after it left the egg, I found that it had very recently moulted whilst still in the mine and that the body was now nearly cylindrical, that it had trophi of the second form, and articulated thoracic legs each armed with a claw. On Friday evening, July 16th (the larva now being about seven days, within a very few hours, more or less, old) it was still in the mine, but not feeding, and I *think* it had just moulted (2nd moult); but at an early hour the next morning it had left the mine and was found on the leaf near to the mine, and not feeding. I think it had very recently quitted the mine. Three hours afterwards I found that it had gone to the tip of the leaf which it had rolled up and was feeding in the roll; and on opening the mine two exuviæ were found in it, one of which had the head and

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trophi of the first form, and the other and larger one of the second form. It had therefore been in its mine within a few hours, more or less, of seven days, and had undergone two moults there. On the next Friday, July 23rd, I found that the larva was not feeding, so I unrolled its cone and found in it two more casts, one of which was still fresh. Here were therefore two moults *within* the week, making four in two weeks from the egg, and the larva was a little more than half grown. It eats much more and grows much more rapidly in its last stage. When taken from its roll, as just stated, it was placed upon a fresh leaf, where in a little while it had curled up the edge of the leaf, fastening it all around by a web instead of by the little cords as in its first roll. On Monday morning early, July 26th, it was still in its roll, but three hours later it had left the roll and begun its cocoon at the edge of the leaf. This is unusual, as the mine when the larva is free is placed over the midrib. The contraction of the silk curled the edge of the leaf over the cocoon. The pupa was disclosed early in the morning of the 28th July, about two days after the cocoon was begun, but less than a day after the cocoon was finished; the four previous moults each occupied about twelve hours, as I was able to determine approximately by observing whether or not the larva was feeding. There are thus five larval stages. The entire larval life before beginning its cocoon is about seventeen days, within a few hours more or less, giving nineteen days as the entire larval life. This is about the length of larval life in *Lithocolletis* and *Leucanthiza*. That of *Phyllocnistis* is not known; that of some species of *Nepticula* (a genus very far removed from the others above named) is sixteen days in some species, only a week in some others, and probably even less in some others. In the larva whose history I have given above the imago was disclosed Aug. 4th, so that the pupa state lasted just a week, or just twice as long as any single larval state. The same rule holds in *Lithocolletis* and *Leucanthiza*. In *Phyllocnistis* we do not know the length of the larval stages, but the pupa state lasts eight days. I refer only to the summer broods, of course. In some species of other genera, as *Nepticula pteliœella*, not yet described, the first and second larval stages each last three days, whilst the third (and last one) lasts just twice as long—six days, and has just double the rate of growth, so that it looks as if a regular moult had been skipped. Is the pupa state likewise the equivalent of two larval stages?

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ON A LATELY DESCRIBED SPECIES OF LIMENITIS.

BY H. STRECKER, READING, PENN.

Mr. W. H. Edwards' *Limenitis Eros* published in the Dec. (1880) No. of Can. Ent., p. 246–251, is the same insect described by myself two years since in the Synonymical Catalogue, p. 143, as follows: *Limenitis Misippus* " var. a. FLORIDENSIS, nob.—The form found in Florida and other parts of the extreme south. Whilst our more northern form is of the same color as *Danais Plexippus*, this southern variety exactly mimics in its dark coloration *Danais Berenice*, with which it associates." From this I think it will be seen that Mr. Edwards was in error in his supposition that *Floridensis* was different from *Eros* and indicated a species with dark upper surface and pale under side of secondaries, as neither in the place above cited nor anywhere else have I made any such statement or said anything that would lead to such a supposition. My types were sent to me from Apalachicola, Florida, by Dr. A. W. Chapman, a number of years since, and they are as dark below as above, or at least the difference in shade is so little, if any, that it takes the closest examination to detect it; had there been any perceptible difference between the color of the upper and lower surfaces, or between the primaries and secondaries on either surface, I should have mentioned it in my description, which, though brief, I think was sufficiently to the point in regard to color when I said " this southern form mimics in its dark coloration *Danais Berenice*," which latter, as is well known, is of the same color on both upper and under surfaces. I believe now as I did at the time I described this form, that it is only a southern variety of *Misippus* found in southern Alabama, Mississippi and Florida (I once received it from New Orleans, La.) Even the differences in the processes in the three cuts accompanying Mr. Edwards' paper are not greater between (fig. a) the one representing *Floridensis* (his *Eros*) and any one of the other two representing the type form of *Misippus (Disippus)* than between the two latter (figs. b. c.) And as regards any difference in the larvæ, I do not see why a variety or aberrant form is not as likely to differ from the type in the earlier stages as it is in the imago.

The form that Mr. Edwards mistook for *Floridensis*, of which he writes as being " almost as dark as *Eros* on upper side " and in which " the under side of secondaries is but little darker than in many northern examples," is entirely unknown to me; out of hundreds of *Misippus*

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(Disippus) which I have seen I never detected one that answered to such a description; all that I have seen belong either to the common pale tawny typical *Misippus* or the southern dusky var. *Floridensis (Eros* Edw.); excepting the two monstrosities *nigra* and *Pseudodorippus*, which are neither species nor permanent varieties, but mere freaks of nature.

Reading, Jan'y 13, 1881.

ON A NEW SPECIES OF PACKARDIA.

BY L. W. GOODELL, AMHERST, MASS.

For several years I have had in my collection, among other undetermined specimens of Bombycidæ, a species of *Packardia* which did not seem to agree with any of the published descriptions that were accessible to me. Mr. Grote, to whom I lately submitted the specimen, kindly informs me that it is as yet undescribed.

'PACKARDIA NIGRIPUNCTATA, n. sp.

1 ♀. Fore wings light bronzy brown; a narrow, oblique, nearly straight, dark brown band runs from near the inner margin outward to a little beyond the middle of the costa, where it is joined at a right angle by another band which is short and curved, terminating at about one-third of the distance from the costa to the inner angle. Between the end of the short band and a little outward and above the internal angle, is a curved row of three roundish black dots, of which the marginal one is three times larger than the inner and twice as large as the intermediate one. The bands and spots form a distinct inverted V. Within the area thus formed and parallel with the inner band is a brown line which extends from the inner margin to the discal end of the short curved band. This line is a shade lighter in color than the bands and is edged outwardly with very pale or whitish brown. There is a band of the same pale brown or whitish color which includes the black dots and extends outside of the short curved band to the costa. It is constricted near the inner dot, widening rapidly towards the costa, along which it extends towards the base to a little beyond the middle. Hind wings paler, the apex and outer margin concolorous with the fore wings. Fringe of all the wings pale silky brown interlined near the base with darker brown and with a black

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spot on the apex of the primaries. Fore wings beneath uniformly a little darker than above. Hind wings beneath much as above, but the darker shade of the exterior margin and apex is not so distinct. The wings above and beneath have the peculiar silken lustre common to the genus. Head, thorax and abdomen ochreous brown. Legs grayish brown, the tarsi a little paler. Length of body 7 mil. Expanse of wings 20 mil.

The wings are not so broad as in *geminata* and *albipunctata.*

Obtained from a larva found on oak in Amherst. I very much regret that I neglected to take a detailed description, but as near as I can recollect the larva was oval or boat-shaped in form, green with several longitudinal rows of minute white papillæ or spots. The cocoon was round and hard and the moth emerged June 20.

ADDITIONAL NOTES ON THE GENUS ANTIGASTER OF WALSH.

BY L. O. HOWARD, WASHINGTON.

In the light of Professor Riley's recent criticism (American Entomologist, December, 1880,) upon my conclusion that *Antigaster* Walsh is synonymous with *Eupelmus* Dalm., I have gone over the ground again with his objections before me, and still adhere to my original view. The objections may be summed up as follows :

1st. *Antigaster* has 10-jointed antennæ ; *Eupelmus* (according to Westwood) has 13.

2nd. The club is obliquely truncate from beneath with *Antigaster,* while (according to Westwood) it is ovate with *Eupelmus.*

3rd. The first tarsal joint of the middle tibiæ is "widened and dentate" with *Antigaster,* and simply "furnished with bristles" (according to Walker) with *Eupelmus.*

4th. The abdomen is widened behind with *Antigaster* (? with *Eupelmus).*

It is a very easy matter to show, in regard to the first objection, that the discrepancy in the number of antennal joints arises simply from the

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method of computation. Counting the club as one joint and omitting the "annular" joint between 2 and 3, the antenna of *Eupelmus* would count as 10-jointed (see figure of antenna of *E. Geeri* Dalm., Walker's Notes, p. 76, and also antenna of *E. cereanus* Rondani, Bull. Soc. Ital. Ent., 1877, ii., pl. iv., fig. 122). Applying the ordinary method of computation to the antenna of *Antigaster*, it will be seen to be 13-jointed. The identity of the two is readily seen from the accompanying figure, *b* representing a camera lucida sketch of the ♀ antenna of *Antigaster*, and *a* a reproduction of Walker's figure of *Eupelmus Geeri*.

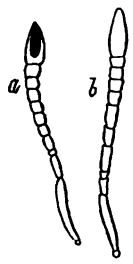

Fig. 3.

With regard to the second objection, an oblique truncation of the club is seen in Rondani's figures of *E. cecidomyinus* and *E. circinantis* (ibid, figs. 147 and 150), and also slightly in Walker's figure reproduced above; so Westwood's definition, "club ovate," does not hold with acknowledged European species.

3rd. The character quoted from Walker (translated by him from Foerster) is incomplete as applying to *Eupelmus*, as Thomson (Hym. Scand. iv., 103) says, "tarsis ♀ semper dilatatis." That the "bristles" of Walker (Foerster) are identical with the "dentations" seen with *Antigaster*, seems most probable from the fact that Foerster, in his figure of *E. Geeri* (Beitr. z. Monog. d. Pteromal., pl., fig. 3) shows projections on the middle tarsi altogether too stout for "bristles"; and also from the fact that the term "rigid pectinations" of Rondani would apply very well to the dentations of *Antigaster*. These are really but a higher development of the strangely modified bristles seen upon the middle tarsi of some Encyrtinæ, notably of *Comys*.

4th. A glance through a number of descriptions of European species of *Eupelmus* shows that the shape of the abdomen varies from the "abdomen lanceolate" of *E. subvittatus* (Walker's Notes, p. 83) to the "abdomen *increasing in breadth from base to tip* of *E. pezomachoides* (ibid, p. 82). So the fourth objection will not hold.

Walker's recognition of *Antigaster* in 1869 certainly amounted to but little, since he entirely omitted it from his generic synopsis in 1872.

I would state in conclusion, as a confirmatory evidence of my view, that, since the American Entomologist article appeared, in looking over a list of Chalcids identified for me by Dr. Mayr, of Vienna, I find that

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specimens of *A. mirabilis*, sent him without name, are entered upon the list as *Eupelmus* sp.

Taking all these facts into consideration, it seems to me quite plain that *Antigaster* should be dropped.

NORTH AMERICAN MOTHS.

BY A. R. GROTE.

(Continued from Page 17.)

Botis lethalis, n. s.

Allied to *atropurpuralis*. Fore wings purply brown to the exterior line, which is distinct, nearly straight, a little bent submedially, dark brown followed by a whitish coincident shade line. Subterminal space pale brown, shaded with whitish. A terminal whitish shade before the broken terminal line. Fringes dull pale brown, interlined. Hind wings pale fuscous, with an extra mesial line apparent inferiorly, bent before anal angle, followed by a pale shade. A fine black terminal line; fringes pale, interlined. Beneath the ornamentation of primaries repeated. Hind wings pale, with a narrow mesial line bent before anal angle. *Expanse* 16 mil. Hab. California.

Botis vacunalis, n. s.

Allied to *dasconalis*. Fore wings and thorax pale yellowish white without markings. Hind wings pure white, immaculate, with a dotted exterior black line, only partially continued; a terminal row of dots at the base of the white fringes. Beneath the primaries are whitish, with the veins marked with fuscous and a transverse extra discal fuscous line. Abdomen white. *Expanse* 24 mil. *Hab.* Sierra Nev., Calif., Mr. Hy. Edwards, No. 3,001.

Botis turmalis, n. s.

♂. This species has a casual resemblance to *Nomophila noctuella*. Pale dusty ochrey. The costa of primaries broadly washed with blackish brown, absorbing the rather large dark discal spots. An exterior dotted line. A terminal series of blackish dots. Hind wings with a terminal

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dotted line before the fringes and an extra mesial dotted line more apparent beneath. A discal dot. Beneath the veins are slightly marked with fuscous and the markings of the upper surface are repeated. Fore wings long, apices pointed, exterior margin oblique. *Expanse* 27 mil. Colorado Rio, Prof. Glover, Aug. 24.

Botis rufifimbrialis, n. s.

Allied to *sumptuosalis*, but the fringes are reddish fuscous cut with deep red. Fore wings purply red over blackish; the costal region and terminal space being very dark. The two discal spots are small and black and difficult to make out; there is a yellow dot between them. Two dark yellow bands cross the wing; the inner oblique, not continued on costal region, not very distinct; median space inferiorly with scattered yellow scales. The outer yellow band is broken into a rather large spot opposite the disc and appears again as a short waved line above internal margin. Hind wings blackish, sub-transparent, with red stained fringes and an abbreviate yellowish line. Abdomen fuscous above, pale beneath; legs, pectus and under side of palpi pale or whitish; palpi and thorax above dusky. Wings beneath paler than above, especially the secondaries at base, within a darker marginal shade. *Expanse* 16 mil. Mass., Mr. L. W. Goodell.

Botis flavinotalis, n. s.

Allied to *octomaculalis*. Wings black, the fore wings sprinkled with sulphur yellow scales, forming streaks at the base. Fore wings with two sulphur spots, one irregularly rounded over the median nervules, the other at the end of the cell narrowing to costa. Hind wings with two mesial sulphur spots, the lower elongate. Fringes pale. Abdomen finely ringed with yellow. Beneath the spots are whiter; on the secondaries the mesial spots are surmounted by one on costa. At base on both wings the pale yellow color appears as blotches or streaks. Breast and head with powdery yellowish scales. Thorax black with fine yellow lines bordering the tegulæ. *Expanse* 20 mil. Pennsylvania, Mr. Hy. Edwards. The species has a false appearance of a *Melicleptria*.

Botis annaphilalis, n. s.

Fore wings dark gray with a large brown suffused spot below the black reniform. Ordinary lines obsolete; fragments of the subterminal line appearing at internal margin and below costa as black marks. Inner line

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faintly visible. Hind wings faded reddish orange with fuscous fringes, with a black line slightly waved at their base. Fringes of fore wings blackish with pale dots. Beneath both wings orange, fringes fuscous; on primaries a discal streak and a spot above on costa. Body dusky gray; abdominal hairs somewhat orange; beneath paler, somewhat whitish. *Expanse* 27 mil. Havilah, Cal., Mr. Hy. Edwards. This species has the false appearance of an *Annaphila*. It is easily recognized, and seems allied to *fodinalis* Led.; it is as large but very different in colors and ornamentation.

Crambus undatus, n. s.

Allied to *exsiccatus*, but smaller, with the lines without the submedian indentation. Pale whitish gray over light brown, a whitish shade from base along the centre, the wing with scattered fuscous scales. The two fuscous brown lines are very distinct, sub-parallel, near together, well removed outwardly, jagged, angulated below costa, the inner line a little more inwardly oblique and irregular below the cell than the outer. A fine dark line at the base of fringes, which latter are interlined and metallic at the tips. Hind wings pale with a subterminal line feebly marked on both surfaces. Fore wings fuscous beneath with the lines indicated. *Expanse* 21 mil. California, Mr. Hy. Edwards, No. 4454.

Catocala grynea var.

Mr. A. Conradi has collected near Bethlehem, Pa., a singular aberration of this species in which the black bands on the under surface are very broad and the secondaries above almost entirely black, except a yellow spot at base and two more beyond the middle of the wing.

NOTES UPON CLIMATIC INFLUENCES ON SAMIA GLOVERI OF UTAH AND S. CEANOTHI OF CALIFORNIA.

BY A. H. MUNDT, FAIRBURY, ILL.

The summer of 1879 was quite warm and dry in Utah as well as California. This was very disastrous to the larvæ of *S. Gloveri*, which, it is well known, feed on the willows in Utah growing in or near swamps or near creeks in canons.

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That year more than half of the cocoons received during the winter were dead; many of the larvae had but half changed, *i. e.*, half was stlll larva, the other half (generally the lower) had already changed to pupa, and in most cases, with the larval skin still clinging about it, in a few partly split open at the back, thus exhibiting the pupa in part. Some, in fact, thus received were alive in that curious condition until spring; very few of the living pupae were of the proper size. The collectors had also much trouble in gathering them.

However, while *Gloveri* under such conditions did not thrive well in Utah, *ceanothi* in California made splendid cocoons, and but very few, comparatively, did not produce fine imagoes, while most of the *Gloveri* that did hatch were crippled.

This season, 1880, the weather seemed quite the reverse of 1879; the atmbsphere was more damp, and cocoons received during this winter from Utah are very much larger, heavier and healthier in appearance than in the former; in several large lots received but very few were not good, and the collectors in the winter of this season had less trouble in obtaining them and were only prevented from gathering large quantities by the deep snows occurring in Utah this winter.

The change with *ceanothi* was this season again the reverse, as my correspondents write me frosts occurred nearly every morning in those portions of California quite late in the summer, the result being that *ceanothi* was very late and also scarce, and the cocoons very much smaller compared with the previous season, and many of these were no good. Larvae received from Mr. Baron, arrived Sept. 10th, were not half as large as those I had raised here in a moderately tempered but well ventilated brick building.

Certain it is, however, that localities may be found in seasons of general scarcity, in valleys or protected by surrounding hills or woods, where certain species may be found in great abundance and in fine condition.

With many experiments I have tried for three seasons, I am convinced that cocoons of *Gloveri* should be kept in a cool place in winter (freezing will not hurt them), or they will hatch cripples, if alive at all; while *ceanothi* should be kept in a place neither too warm nor dry, but not too cold, until the spring season is well upon us.

That *Gloveri*, *ceanothi*, *columbia* and others of that family are originally of one form, whether *cecropia* or some other species, I have no doubt; of course climatic and food changes, for many generations, as is well known

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in other departments of zoology as well as botany, have brought about great changes. I have had no trouble in crossing ♂ and ♀ *Gloveri* with *ceanothi*, *cecropia* and *ceanothi*, and *Gloveri* and *cecropia*, and have now in my possession some fine cocoons of such hybrids between *ceanothi* and *cecropia*, of which I will speak after the imago appears.

ENTOMOLOGICAL NOTES.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

1. *Cecidomyia spec.* on *Aristolochia sipho.*

Flat rounded galls on the under side of the leaves, pale, somewhat transparent, pale greenish, 4 mil. diam. On the upper side of the leaf the gall becomes a slightly elevated disk marked with dark red and having in the middle a small pale-bordered hole. The galls grow larger and more globular on the stems of the leaves, to globes of 8 mil. diam., some more elongated, 18 mil. long and 8 mil. broad. The larvæ are brick red, 3 mil. long, very agile. I find no species on *Aristolochia* described by Osten Sacken and others.

2. Caterpillar of *Papilio philenor* on *Aristolochia sipho.*

I received a number nearly full grown, and young ones (about 10 mil. long). Harris, Ent. Corresp., p. 147, discovered them on the same plant in the botanical garden in Cambridge, August, 1840, and Mr. Scudder, List of N. Engl. Butterflies, p. 162, says "once or twice taken in Eastern Mass. last September." I don't know if the species is taken more often, but it is remarkable that the caterpillars (about two dozen) were nearly full grown on June 16th, as Harris and Scudder give August and September.

3. *Nematus Erichsoni* on *Larix Europaca.*

A large number of larvæ very young to nearly full grown, some probably full grown, were sent living with the twigs. The larvae agree perfectly with description and figure in Ratzeburg's Forst-Insecten, Tom. iii., pl. 3, f. 4. The species is not represented in the collection here, neither in the larva nor in the imago state. It is not mentioned in Mr. Norton's Catalogue of N. Am. Tenthridinidae. I have to remark that the larvae of the three other species living in Europe on *Larix*, viz., *Lyda laricis*, *Nematus solea* and *compressa*, from their description, do not agree with those sent to me. I am indebted to the Harvard Arboretum and its Director, Mr. Chas. S. Sargent, for these specimens.

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THE LARVA OF CATOCALA UNIJUGA.

BY D. S. KELLICOTT, BUFFALO, N. Y.

I obtained, June 16, 1880, from the trunk of a *Populus candicans*, at Buffalo, N. Y., two larvæ which proved to be those of *C. unijuga*. They had passed their last moult when taken; although they continued to feed in confinement for five or six days they increased in size but little during that time; their habits are strictly nocturnal. When first observed they were clinging to the bark beneath a limb, lying obliquely, and so flattened and leech-like that, together with their gray color and lateral fringes blending with the bark, they were difficult objects to discover; but for the fact that the first one seen occurred on a plane with the eye they would have been overlooked entirely. When disturbed they jerk themselves from side to side and move off rapidly with the gait of a semi-looper, although possessing sixteen legs.

The larger one measured 2.2 inches, the smaller 2 inches. The body is attenuated at extremities, especially anteriorly. The general color is gray above, below pink with a sub-elliptical black spot to each segment, those on the thoracic rings not conspicuous. The head flattened, slightly bilobed, lighter in hue than the body and bordered by a well defined black line., The lighter head lobes under a hand lens appear mottled and reticulated with black lines and blotches. The dorsal line is white, made up of patches, illy defined circles and spots alternating; on each ring on either side of the line there are two white papillæ from each of which arises a white hair; above the stigmata there is a white interrupted line, below them a black line also interrupted. The stigmata are rather large, elliptical, whitish surrounded with a black border. There is a row of stout hoary filaments just above the line of the legs. No protuberances appear on the dorsal aspect of any of the rings.

June 22nd the larvæ ceased to feed. On the following day they had fastened together some leaves by means of a silken gauze, brownish in color; by the 26th both had transformed. The larger pupa measured 1.2 in. At first the thorax and abdomen are red, wing covers dusky; after a few hours the whole surface becomes densely pruinose. Under the microscope the surface appears rough like Russia leather. The stout thorax is quite convex above, head smooth, abdomen attenuated, its tip black, bearing eight hooked hairs, the four upper, smaller, turn towards the median line, the four under, larger, turn away from it; by hooking

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into the cocoon they retain the pupa more securely. The pupa and the larva also in cocoon before its change, when disturbed, throw themselves from side to side so rapidly as to give a sound like a shaken seed pod.

July 15th, one pupa disclosed a male *unijuga*, rather under size; the second, smaller one, failed to give an imago.

Notes.—July 11th, when taking dinner at a farm house, I saw a large female of this species fly in at the open door; it flew about the room until captured. There was a specimen of *P. candicans* growing hard by.

BIBLIOGRAPHY OF ECONOMIC ENTOMOLOGY.

We desire to call the attention of our readers to the following circular lately issued from the Department of the Interior:

DEPARTMENT OF THE INTERIOR.
Office of the U. S. Entomological Commission,
Providence, R. I., Jan'y 1st, 1881.

DEAR SIR,—

The U. S. Entomological Commission designs preparing for publication a bibliography of American (and Canadian) economic entomology. The bibliography will contain references to papers, articles and notes in agricultural and popular scientific periodicals, as well as journals devoted to bee culture, and as complete as possible references will be made to entomological notes in those periodicals which appeared prior to 1850. The titles of notes, articles, reports on works, will be entered under the name of authors, or of periodicals, especially agricultural reports and papers with brief digest of contents given in a line or two, in the same style as in Mr. Mann's excellent bibliographical record of *Psyche*, the organ of the Cambridge Entomological Club, of Cambridge.

After due pains are taken such a record will necessarily be quite imperfect. The compiler will have to rely much on aid from authors of any and every article or note in economic entomology. Its completeness will greatly depend on the care with which entomologists may prepare lists of their own articles. Entomologists are, therefore, earnestly requested to co-operate by sending full lists of their papers on any subject connected with *economic entomology* (not general or scientific entomology unless bearing on the applied science) and prepared in the style of that of *Psyche*, to the undersigned, at Providence, R. I. Very respectfully,

A. S. PACKARD, JR.

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ON A VARIETY OF CATOCALA NEBRASKAE, Dodge.

BY G. M. DODGE, GLENCOE, NEBRASKA.

Catocala Nebraskae Dodge, var. *Somnus.*

Fore wings, head and thorax black, thinly powdered with gray scales. Abdomen and long scales at base of hind wings clear black. Fringes of wings as in typical specimens. Legs and under side of body dark. All the lines on fore wings indistinct, being merged in the ground color. Two ♂'s. Glencoe, Neb.

Normal *Nebraskae* has fore wings, head and thorax light gray, sprinkled with black scales. Abdomen pale brown. Lines black and very distinct.

A LIST OF THE BUTTERFLIES FOUND AT POTSDAM, N. Y.

P. asterias, Drury; common last of June and July.
turnus, Linn.; very common May and June.
Arctic form; common May and June.
Orange var., shown in Edward's Plate iv., Pt. vi.; scarce.
oleracea, Harris; scarce, July.
rapae, Schrank; generally very common all summer.
var. nov. angliae, Scud.; rare, but one specimen taken July 19, '77.
Colias philodice, Godart; very common all summer.
D. archippus, Harris; generally common, August.
A. aphrodite; scarce, August.
myrina; common, July.
bellona; rather common, July.
M. phaeton, Drury; common a short time in June, very local.
V. antiopa, Linn.; very common in Oct., worn specimens early in April.
cardui, Linn.; generally common June, quite scarce 1878.
milberti, Godt.; rather common last of May and during June.
atalanta, Linn.; " " "
J-album; rare, but one specimen taken.
L. misippus; common, July.
arthemis, Drury; very scarce middle of June.
S. nephele, Kirby; common last of July, Aug. and first of Sept.
G. c-argenteum, Kirby; " " " "
L. violacea; early in May.

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The Canadian Entomologist.

VOL. XIII. LONDON, ONT., MARCH, 1881. No. 3

ENTOMOLOGY FOR BEGINNERS.

THE SATELLITE SPHINX—Philampelus satellitia Linn.

BY THE EDITOR.

This is one of the most beautiful of our Sphinx moths, a rare as well as lovely creature, and an object highly prized by collectors. It is found throughout the northern United States and occasionally in Canada, but is no where very common.

Fig. 4.

The moth (fig. 4), when its wings are expanded, will measure from four to four and a half inches across. Its color is of a light olive mixed with gray and varied with patches of a darker olive green, rich and velvety, and some portions with a rosy hue. The moths appear in July, when after pairing, the female deposits her eggs singly on the leaves of the grape-vine or Virginia creeper (Ampelopsis quinquefolia), where they shortly hatch into small green larvæ of a pinkish hue along the back and with a very long pink horn at the tail. As the caterpillar increases in size the tail becomes shorter, and after a while curves round as shown at

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c in fig. 5. As the larva approaches maturity it changes to a reddish brown color, and after passing the third moult entirely loses the caudal horn, which is replaced by a glassy eye-like spot. The mature larva when in motion, as shown at *a*, fig. 5, will measure nearly four inches in length, but when at rest it draws the head and two adjoining segments within the fourth, as shown in the figure at *b*, which shortens its length nearly an inch, giving it a very odd appearance with its anterior portions so blunt and thick. It is of a rich reddish brown color, of a lighter shade along the back, with five or six nearly oval cream-colored spots along each side from the fifth to the tenth segments inclusive; sometimes the spot on the fifth segment is indicated by a dot only, in other instances entirely wanting. On the anterior segments there are a number of black dots; a dark polished raised eye-like spot in place of the tail; stigmata black, showing prominently in the cream-colored spots along the sides.

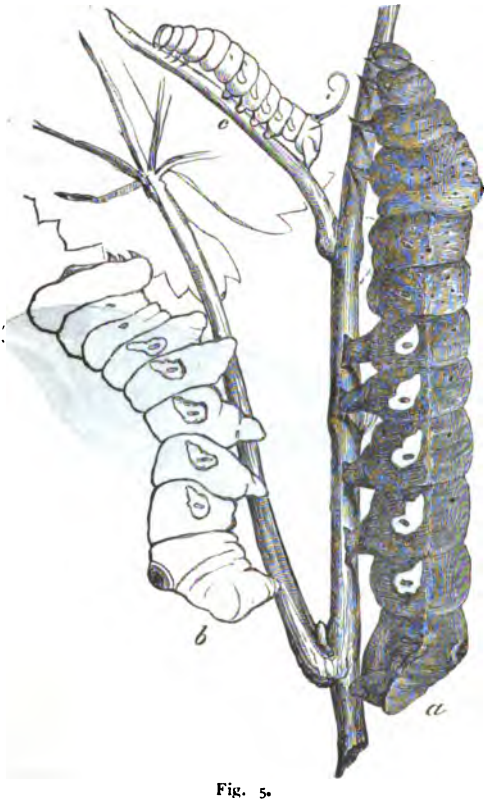

Fig. 5.

It is a very voracious feeder, and where present strips the vine so rapidly of its leaves that it soon attracts attention. When full grown it descends and buries itself in the ground, where it forms an oval cell within which it changes to a chrysalis.

The chrysalis is of a chestnut brown color with the segments roughened with impressed points, the terminal ring having a long thick spine. The insect usually remains in the chrysalis state until the following summer, but sometimes it hatches the same season. In the 9th vol. of the

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CAN. ENT., p. 120, an instance of this sort is recorded by Mr. R. Bunker, of Rochester, where the larva became a chrysalis on the first of August and produced the moth on the 10th of September. Should these larvæ at any time prove troublesome, they can be readily subdued by hand-picking.

LIST OF N. AMERICAN ANTHOMYIDAE, EXAMINED BY R. H. MEADE, ESQ., BRADFORD, ENGLAND.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

Mr. R. H. Meade has kindly examined the N. American Anthomyidæ of the Museum of Comparative Zoology in Cambridge, forwarded to him by the Baron von Osten Sacken. The collection was returned last year by the Baron to the Museum. The species are separated carefully and accompanied by a list giving the genera and species, the latter not named except when identical with European species. The notes and determinations of the list differ sometimes from the notes previously published by Mr. R. H. Meade in the Entom. Monthly Mag., 1878, xiv., p. 230–250. Those differences and the more complete statements in the list induced me to publish it, thinking it to be ungrateful to Mr. Meade that his extensive and thorough examination should rest in the archives of the Museum and be lost to science. Baron von Osten Sacken stated in his letter that he has not the intention to work out the Anthomyidæ. I have carefully compared the labeled types in the Loew collection, and have added always the locality for the species examined by Mr. Meade. Where I was able to make out identities, they are given. The collection of the Museum, out of which the Baron himself selected the lot sent to Mr. Meade, will probably contain only duplicates of the lot, except in later additions. Loew's collection contains a number not yet assorted and some new species. Types of European species sent by Loew, Schiner, Gerstaecker and Jmhoff, have been compared with the American ones. O. Sacken's Catalogue has 139 N. Amer. species, including a large number of Fr. Walker's not yet scientifically compared. Mr. Meade has counted (with a few varieties) 121 species, and Loew's collection contains 12 species not seen by Mr. Meade; therefore the whole number of N.

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Am. species is 133. Mr. Meade has identified among them 27 European species and Loew 7 more; therefore 34 species seem to be identical with European ones. The Museum owes the most sincere thanks to Mr. Meade and to Baron v. Osten Sacken.

Genus HYETODESIA Rond. (Aricia pt. Macq.)

1. Bears a considerable resemblance to *Aricia marmorata* Zett.; 8 male and female; Lake Super., Huds. Bay Terr., Can., N. Hampsh.

   No specimen of *A. marmorata* is at hand. I consider *A. morioides* Zett. (perhaps *A. mori* Zett. of O. Sack. Cat., p. 164) to be identical with No. 1. Loew's type is a female from Sitka (Sahlberg), and an *Aricia*.

2. Is perhaps a variety of No. 1; the longitudinal thoracic stripes are narrower; 2, male and female; Lake Super., N. Hampsh.
3. Closely corresponds to the descriptions of *A. serva;* this is perhaps also a var. of No. 1; 1, female; Norway, Maine.
4. Seems identical with *A. lucorum* Fall.; 1, male; West N. Y.
5. Is very similar to *A. obscurata* Meig.; 1, male; Huds. Bay Terr.
6. Differs from any species I know; 4, male and female; Brit. Amer., Western N. Y.; Geysers, Cala.

   This species is *A. parviceps*, Loew collect., from Sitka, Sahlberg, male, female; the male agrees perfectly with No. 6; the female differs somewhat, but the 4 spec. of No. 6 seem to represent varieties.

7. Bears a very close general resemblance to *S. pagana* Fabr., but differs by having the eyes decidedly pubescent and also by having 3 instead of 4 thoracic bristles behind the suture; 2, male and female; Englewood, N. Jers.; Maine.

   This species is identical with *H. angelicæ*, Loew coll., male and female (*Spilogaster angelicæ* O. Sack. Catal., p. 165) and one European type sent by Loew as *Fellaca angelicæ* Scop. The differences quoted above agree with *F. angelicæ;* nevertheless the eyes are a little less pubescent in the only European specimen before me, but decidedly as pubescent in the 2 Amer. specimens in Loew's coll.

   There are in Loew's coll. the following species named, all different from the No. 1–7: *A. schinophora*, 3, male and female, from Sitka, Sahlberg, and from Alaska, related to No. 5 but different. *A. consors*, 2, male and female, from Sitka, Sahlberg, allied to No. 6.

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A. spec., 1, female, from Wisc., *simillima A. Bilbergi*, differt tarsis anticis. In Ent. M. Mag., xiv., p. 250, Mr. Meade has mentioned a species closely resembling *A. lugubris* Meig. This species is not given in his list.

Genus MYDAEA Desv. (Spilogaster p. unspotted.)

8. Unlike any species I know; 1 female, Arctic Amer.

9. Corresponds to the description of *M. floricola* Desv.; 1 female, N. Y. This is *Spilog. urbana* Loew, O. Sack. Catal., 3, male and female, in Loew's coll. from Br. Amer. and Conn.; I cannot compare *M. floricola*, but the specimen No. 9 agrees with the European type of *M. urbana* sent by Mr. Meade.

10. Male, Canada; 11 females and 12 males, Western N. Y.; 13 females, Catskill Mts., N.Y.; 14 males, Canada; 15 males, Arctic Amer. Unlike any species known to me. No. 12 seems to be identical with *A. flexuosa* Loew, male and female, from Sitka.

16. Very similar to *M. flaveola* Fall., but has the external transverse vein straight instead of curved; 4, male and female, from White Mts., N. H.; Quebec, Can.; Huds. Bay Terr.; Catskill Mts., N.Y. In Loew's coll. labelled *A. diaphana (Limnophora diaphana* O. Sack. Catal., p. 166); 7, male and female, from N. Hampsh.; Me.; Brit. Amer.; the specimens are identical with European types of *A. diaphana* sent by Loew.

16.*a*. An imperfect species, very like *A. varians* Zett.; 1 male, Canada; abdomen wanting; agrees well with one European type sent by Loew.

Genus SPILOGASTER Macq. (spotted.)

† Legs black. All species unlike any known to me.

17. 3, male and female. Ky.; Lake Super.—18; 1 male, Huds. Bay Terr.—19; 1 female, Huds. Bay Terr.—20; 1 male, no loc.

21. 1 female, Huds. Bay Terr.—22; 1 male, no loc.

†† Legs wholly or partly yellow.

23. Differs from any species I know, but appears to be the analogue of *S. uliginosa* Fall.; 2, male; R. I.

I have compared European types of *S. uliginosa* sent by Mr. Meade and Loew, but they differ so strikingly from No. 23 that I am unable to say why they are analogous.

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24. 1 male, Western N. Y.—25. 1 female, Cambridge, Mass. Both unlike any species known to me.

26. The generic position of this injured specimen is rather doubtful; 1 female, D. C.

27. Corresponds to Rondani's description of *S. hirticrura* and is very like *A. pertusa* Meig.; 7, male and female, from N. Y. and Ill.

I cannot compare *A. pertusa* nor *S. hirticrura;* the species is *Anth. trabeata* Loew; one type of Loew with his label is among the specimens No. 27; in Loew's coll. there are 7 specimens from N. Y., Ill., Pa., D. C.

Mr. Meade says, Ent. M. Mag., *l. c.* p. 251: In *Spilog*, there were eleven species. . . . There was only one male in the collection, and it bore a remarkable resemblance to *Cyrtoneura meditabunda* Fabr. The fifth longitudinal wing vein was curved in a similar manner towards the fourth vein, though in a less degree. . . .

There must be some misunderstanding here which I am not able to solve, as the eleven species before me contain 12 males belonging to 7 species. I have compared every one carefully with a type of *Cyrt. meditabunda* sent by Loew, without finding any male corresponding to the characters of *C. meditabunda*. Later I found among the Diptera not seen by Mr. Meade one female very well agreeing with the characters mentioned, bearing a label *M. meditabunda?* written by O. Sacken.

Genus HYDROPHORIA Desv.

28. Unlike any species known to me; 1 female, Connecticut.

29. Resembles *M. ambigua* Fall.; 1 male, Huds. Bay Terr.

30. Unlike any species known to me; 1 female, Brit. Amer.

Genus DRYMEIA Meig.

31. A well marked species which differs slightly from the only European one, *D. hamata*, 4, male and female, from Huds. Bay Terr.

It is difficult to decide about the similarity with *D. hamata*, as the Amer. specimens are in a rather indifferent condition; the European types sent by Mr. Meade and Loew are much larger. Formerly, *l. c.*, p. 251, Mr. Meade had considered them to be quite distinct.

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Genus HYDROTEA Desv.

32. Appears to be identical with *H. dentipes* Fall.; 1 female, Canada.

In Loew's coll., 2 females, 1 from Sitka, Sahlb., with the same determination.

33. Seems identical with *H. armipes* Fabr.; 3, male and female, Cambridge, Mass.

In Loew's coll., 1 male from Nebraska with the same determination.

Genus LASIOPS Meig.

34. Something like *L. canotans* Meig., but it is not identical; 1 male, Br. Colombia..

35. Not like any species known to me; 4, male and female, N. Hampsh.

Genus OSPHYRA Desv.

36. Similar to *A. leucostoma* Fall.; 5, male and female, from D. C., Mass., Maine.

In Loew's coll., 5 male and female, from Maine, New York, D. C., identical with No. 36, labelled *A. leucostoma.*

36.*a.* Not like any species known to me; 2, male and female, Canada.

Genus LIMNOPHORA Desv.

37. Somewhat resembles *A. compuncta* Wied., but has the eyes more widely separated in the male; 6 male and female, from Mass.; N. Y., D. C.; Hudson Bay Terr.

38. 1 male, N. Y.—39; 1 male, Connect.—41; 1 male, Huds. Bay Terr. —42; 1 female, N. Y. 43; 1 male, Mass.—43 *a* (lost) Huds. Bay Terr. All not like any species known to me.

40. Very like *Coenosia triangulum* Zett. This species might perhaps be placed in the genus *Coenosia*, as the eyes in both sexes are separated by a widish interval. But this occurs to some extent in nearly all the species of this genus; 1 male, Catskill Mts., N. Y.

L. stygia Meig., O. Sacken Catal., p. 152, in Loew's coll. from Sitka, Sahlberg, is not represented among the species examined by Mr. Meade. *L. triangulifera* Zett., †male, labelled by Loew, is in the collection of the Museum.

Genus HOMALOMYIA Bouché.

44. Identical with *M. canicularis* Linn.; 11 male and female, from South Greenland; Mass., Maine, Conn.

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In Loew's coll. are 10, male and female, N. Y., Maine, with the same determination.

45. Identical with *A. scalaris* Meig.; 8, male and female, Maine, Mass., Pennsylvania.

In Loew's coll, 12 male and female, D. C., Pa., Wisc., with the same name.

46. Identical with *M. prostrata* Rossi (*invisurata* Zett.); 2, male and female, N. Y., Mass. There are 3, male and female, from the same locality in the Museum's coll.

47. Probably only var. of *H. canicularis;* 4 females, Middle States, Mass.

49. Not like any species known to me; 1 male, N. Hampsh., abdomen wanting; the other from Hudson's Bay Terr., lost.

Probably *H. serena* Loew, but the specimen is too imperfect to be sure.

50. Not like any species known to me; 4 females, from South Greenland; N. Y. All imperfect.

There are in Loew's collection the following determined species: *H. manicata* Meig., from Sitka, Sahlb.; *H. serena* Fall., from Br. Amer.; *H. subpellucens* Zett., from Sitka, Sahlb.; *H. tetracantha* Loew, from Middle States; *H. femorata* Loew, from Cuba. The *H. spathulata* Zett. quoted with * in O. Sack. cat., p. 170, is not represented.

Genus AZELIA Desv.

51. Seems identical with *A. Slaegeri* Zett.; 1 male, N. Hampsh.

Genus ATOMOGASTER Macq.

Is not among the specimens examined by Mr. Meade, but represented in Loew's coll. by 5, male and female, from Texas; Nebr. *A. albicincta.*

Genus ANTHOMYIA Meig.

52. Identical with *M. radicum* Linn.

53. 3 males, Regio. arct.– 54; 1 male, probably Mass.—55; 1 female, Cambridge, Mass.—56; 2, male and female, no loc.—58; 1 male, Illinois. All not like any species known to me.

57. Identical with *A. latitarsis* Slaeg. & Zett.; 2, male and female, from N. Hampsh. and N. Y.

59. Very similar to small specimens of *A. pluvialis;* 1 male, Long Island, N. Y.

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Genus HYLEMYIA Desv.

† Legs black.

60. Not like any species known to me; 10, male and female, Brit. Am., N. Y., N. J.

61. Not like any species known to me ; 5, male and female, N. Hampsh., N. Y., Conn.

62. Resembles *H. antiqua* Meig.; 2, male and female, Hudson's Bay Terr., Reg. Arctic.

Is identical with *H. deceptiva* A. Fitch, 2 types in Loew's coll.

†† Legs yellow.

63. Not like any species known to me; this is perhaps *A. alcathoe* Walk. Mus. Cat.; 6, male and female, N. Hampsh., N. Y., Mass.

Is identical with *A. tarsata* Sik., male and female, N. Y., Ill., labelled by Loew.

In Loew's collection are 2 males from Cuba, types of *H. angustifrons* Loew, united (O. Sack. Cat., p. 167) probably after examination of Macquart's type with *H. pici.* Loew has written on the label : " Can be taken to be *H. pici*, if it is assumed that the artist has allowed himself wild fancy in drawing the veins of the wings and the bristles of the legs." On the label of the second specimen is said : " Probably the pale-winged variety quoted by Wiedeman as his *quadrilineata.*"

64.—73. Unlike any species known to me. 64. 4, male and female, N. Y.—65; 1 female, N. Y.—66; 2 females, N. Hamps.—67; 1 female, Hudson's Bay Terr.– 68; 1 male, D. C.– 69; 3 females, Hudson's Bay Terr., Canada, N. Hamps.—70; 3 males, N. Y.—71; 2 females, Lake Super.— 72; 1 female, Maine.—73; 3 females, Nebraska.

Genus CHORTOPHILA Macq.

† Legs black.

74. Very similar to *C. floccosa* Meig.; 1 male, Mass.

75. 1 male, Mass.—76; 1 female, California– 77; 1 male, Regio Arct.—All unlike any species known to me.

78. Seems identical with *A. angustifrons* Meig.; 5, male and female, Br. Amer., Maine, Mass.

Is identical with *Anthom. calopteni* Riley, infesting the eggs of *Caloptenus spretus*, after the types in the Museum sent by Mr. Whitmann from St. Paul, Minn.

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79.—85. 85 *a*. Not exactly like any species known to me. 79. 1 male, Hudson's Bay Terr.—80, 1 male, N. Y.—81; 1 male, Canada—82; 1 male, N. Y.—83; 1 male, Hudson's Bay Terr.—84; 10, male and female, Hudson's Bay Terr., Maine, N. Y., D. C., Arctic Reg.—85; 8 females, Mass., Conn., N. Y.

†† Legs yellow.

86.—92 and 96–101. Unlike any species known to me. 86, 1 male, Conn.—87, 2 females, Conn.—88, 1 male, Cala.—89, 3, male and female, N. Y.—90. 5, male and female, N. Y.—91. 7, male and female, Mass., bred from Rumex by O. Sack.—92. 1 male, N. Y. —96. 1 female, Hudson's Bay Terr.—97. 1 female, no loc.—98, 1 female, South Greenland. 99, 1 female, Hudson's Bay Terr.—100, 1 female, no loc.—101, 1 female, Regio Arct.

93. Resembles *A. gilva* Zett.; 2 females, N. Y.

94. Very like *A. vittigera* Zett.; 3, male and female, N. Y.

95. Very like *A. flavoscutellata* Zett.; 1 male, N. Hampsh.

In Loew's coll. one species with black legs from Texas is labelled f. *Chort. cilioraca.*

Genus LISPA Latr.

102. Like *L. tentaculata* Deg.; 2 females, N. Y.

Identical with *L. sociabilis* Loew; 5, male and female, D. C.

103. Like *L. oliginosa* Fall.; 1 female, Hudson's Bay Terr.

Identical with the same species by Loew from Ill.

104. Not like any European species; 1 female, Maryland.

In Loew's collection are *L. flavicincta* from Hudson's Bay Terr., and *L. consanguinea* from Texas.

Genus CARICEA Desv. (Cœnosia Meig.)

105. This very distinct species, of which there are many specimens, is different from any European one that I know; the female closely resembles that of *Mydaea impuncta* Meig. 27, male and female, from Hudson's Bay Terr.; Canada, N. Hampsh., Mass., N. Y.

Genus COENOSIA Meig.

106–115; 117–121. Not exactly like any species known to me; 106, 4, male and female, N. Y.—107. 3 females, Cuba, is labelled in Loew's coll. *C. strigosa* Loew. 108. 4, male and female, Mass.—109. 3, male and female, N. Hampsh., C. D., is *C. subsimplex*

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Loew (not described) from D. C. 110. 2 females, Rhode Island —111. 1 male, Canada—112. 1 male, Canada—113. 2 females, Conn. 114. 1 female, D. C.—115. 3 males, N. Hampsh., Conn., D. C., is *C. calopyga* L. from Pa.—117. 4, male and female. Hudson's Bay Terr., N. Hampsh., C. D.—118. 1 male, Hudson's Bay Terr —119. 2, male and female, Canada, Mass.—120. 1 female, Hudson's Bay Terr.—121. 1 male, D. C.

116. Very similar to *C. pygmaea* Zett.; 1 male, Canada.

In Loew's coll. is also *C. modesta* from Washington Terr., not from Washington, D. C., as in O. Sack. Catal., p. 171; and *C. nivea* from Pa.

Genus SCHOENOMYZA Hal.

In Loew's coll. are the types of *S. chrysostoma* from N. Hampsh, and *C. dorsalis* from D. C.

NEW SPECIES OF CYNIPIDAE.

BY H. F. BASSETT, WATERBURY, CT.

CYNIPS Q. CALIFORNICA, n. sp.

Galls: Polythalamous, sessile on the branches of the Californian White Oak (Quercus Hindsii?) Sub-globular, but varying much in form and size. A common form is what may be termed balloon-shaped, the upper part perfectly globular, the lower tapering more or less to the sessile base. They often occur of a long compressed oval form: these are placed longitudinally on the branch and the length is two or three times their breadth or thickness. Those of this form are often of monstrous size, being ten or twelve inches in their greatest circumference. The globular galls are from one to two inches in diameter. In color they are of an opaque white. They are usually smooth, but specimens occur that have a more or less warty surface, and others are found that have slight yellowish brown ridges. Internally they are of a uniform, dense cellular structure, and the not very numerous larval cells (from one to a dozen) lie closely imbedded in this cellular substance.

From their shape and color these galls might easily be mistaken for a species of white fungus which grows on trees.

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My specimens were collected in 1878 and in 1880 at Redwood City, Cal., by Mr. Wm. Sutton, of San Francisco.

There are some very large specimens of these galls in the Museum at Cambridge, collected in Cal. by Baron Osten-Sacken, I believe. They are, with a single exception (*Cynips punctata* B.), the largest galls known to me, and I have given them the name of the State in which they, and so many other natural objects of surprising magnitude are found.

The insects gnaw their way out of the galls in October, but of the growth of the galls themselves I have no information. The insects are all females, and belong to the agamous generation, and in structure they differ but little from *C. inanis*, *C. aciculata*, *C. spongifica* and many others that are, as yet, known only in the female sex.

The insect is described as follows :

Head small; ocelli medium size, very close together. Face covered with short white hairs which are appressed, and which converge towards the mouth. Mandibles large and heavy, shining black at the tips. Maxillary palpi 5-jointed, labial 3-jointed. Antennæ with fourteen joints; 1st joint short, rather thick; 2nd small, globose; 3rd equal in length to the two preceding together; 4th to the 13th gradually shorter; 14th long as the two preceding taken together. Thorax with short appressed hairs, and with grooves as follows: Two parallel lines start near together on the collare, near the dorsal summit, and extend half way to the scutellum; two similar but rapidly diverging lines from the same point on the scutellum, extending half way to the collare. Two starting from the scutellum outside the first pair, and extending to the base of the wings; these last are nearly parallel. All these grooves are smooth and shining, but very fine and only seen to advantage under a magnifier.

Scutellum nearly oval, surface slightly shagreened and with a few scattering white hairs. Fovæ indistinct or wanting.

Pleuræ and legs covered with short shining white hairs. Tarsi dark brown, ungues black. Basal half of the first abdominal segment hairy. Sheath of the ovipositor dark shining brown, not exserted. Ventral hairs microscopic.

Wing veins dark brown, surface of the wings covered with short fine hairs; radial area open, areolet of medium size. The head—except from the mouth to the occiput, which is black—the antennæ and the entire

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insect, including the wings, with the slight exceptions noted above, a *dusky yellowish brown.* Length .22; wing .23 ; antennæ .13.

Described from living specimens.

CYNIPS Q.· AGRIFOLIAE, n. sp.

The galls from which I have reared this really fine species were sent me from California by my brother, H. D. Bassett, of San Francisco, with a branch and leaves of the oak on which they grew. They grow on the twigs of Quercus agrifolia, one of the family of evergreen or live-oaks. The first specimens sent me reached me in November, 1877. From these perfect insects appeared Dec. 21st, 1878. Whether the larvæ matured earlier or later in the warm room in which they were kept, than they would under normal conditions, I cannot say ; but from what I know of other species, I judge this had little effect upon their development.

As they mature in the autumn, and as all that I have yet reared are females, and as these bear a close resemblance to the other agamous species known to me, I conclude that these are the one-gendered generation of a dimorphic form. The gall fly is even lighter in color than *C. Californica*, and these two species differ very greatly in this respect from any other species known to me.

Galls : Monothalamous, perfectly round, very hard, and internally of a dense cork-like consistence, like the galls of *C. globulus.* They are from ¾ to ⅜ of an inch in dimater. The surface is microscopically pubescent and uneven, and the color varies in different specimens (dry) from a rather dark, dull clay color to that of raw umber. The single larval cell is adherent on all sides to the gall substance. The point of connection of the gall with the twig is scarcely discernible in most specimens, in others it is indicated by a minute dot from which fine lines radiate. I learn that these galls are so abundant that the ground is sometimes almost covered with them.

Gall fly : Head, and with slight exceptions, the entire body, are extremely pale yellowish brown, the head and the lower part of the abdomen palest, the first somewhat translucent. Eyes, ocelli and the tips of the mandibles jet black and contrasting beautifully with the prevailing color. Antennæ 14-jointed ; 2nd half the length of the 1st, not globose ; 3rd long ; 4th to 8th gradually shorter, the remaining six short and of equal length. The antennæ light, deepening to dark brown towards the extremity.

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Thorax very finely punctate on the mesothorax, coarser and less regular on the scutellum and with scattered microscopic hairs throughout. Parapsidal grooves: These differ considerably from the usual form, inasmuch as the anterior parallel pair are perceptible only under a powerful lens and appear as smooth shining undepressed lines, and the two diverging lines which rise on the posterior margin reach quite to the collare. These last are very distinctly impressed, as is also the line over the base of each wing. Fovæ small, appearing as a shallow, smooth groove at the base of the mesothorax. There is a scarcely perceptible ridge dividing the groove in the middle. On the breast there is a black spot which is usually quite concealed by the head, and also a dark brown spot on the posterior angle of the thorax; this is concealed by the wings when they are closed. Legs the same color as the body, except that the tarsi are dusky brown and the ungues black.

Wings of a decidedly yellowish hue. Veins slender and pale, areolet distinct; radial area open, long and very narrow.

Abdomen large; 1st segment with a dark, highly polished spot on the anterior dorsal margin, and laterally there are a few fine hairs; 2nd and 3rd segments each with a dark nebulous spot, similarly situated, but less intense and less sharply defined than that on the first segment. Sheath of the ovipositor not exserted, a little darker than the general surface of the body, and with short hairs or bristles along its whole length. In the living specimens there is on each side of the sheath a dark curved line, and seen from beneath these form an elliptic oval. Length .15; wing .18; antennæ .13.

Described from numerous living specimens.

CYNIPS Q. SUTTONII, n. sp.

Hard woody galls forming a prodigious enlargement of the small twigs and branches of Quercus sp.? from Cal. They vary in size from one-half to more than two inches in diameter. Most are globular, while a few are elongated in the direction of the twig which they surround. The wood is very hard, and is curled and twisted as in woody knots generally. The bark is smooth, and in young galls polished and shining. Extending from the centre of the gall quite to the bark, but not piercing it, are a large number of rounded and sub-compressed hollow tubes, closed and bluntly rounded at the base, and flat and slightly enlarged at the top. They are one-half inch in length and three-sixteenths in diameter. It is

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not difficult to remove these tubes or larval cells from partially dried galls. Their thin walls are formed of long straight woody tissue. In the basal third of the tubes are the larval cells, one in each, and above the larva is a thin paper-like partition so concave beneath as to form, with the sides and bottom, an oblate spheroidal larval cell. Above the partition are a few shreds of a pith-like substance that filled the entire tube while growing. The bark is all that offers serious hindrance to the egress of the insect when mature.

I have been thus particular in describing the structure of this gall because several other species known to me have a structure somewhat similar and I do not remember to have seen them described.

Gall-flies: All females. Head black, and with the entire thorax covered with short appressed hairs. Vertex slightly rugose. Antennæ dull dark brown, 15-jointed; 1st joint large, club-shaped; 2nd short, ovoid; 3rd a little longer than two preceding taken together; 4th to the 9th each slightly shorter than the preceding one; 10th to 14th of nearly equal length; 15th very short and small, but separated from the 14th by a very distinct suture. Face black, mandibles dark. Thorax with two short smooth parallel lines, not grooves, which extend half way from the collare to the scutellum, and two outside of these also parallel, which extend half way from the scutellum to the collare; also a smooth line over the base of each wing. All these lines are smooth and entirely destitute of hairs, and in certain lights they appear as slightly raised ridges, rather than as furrows, as is the case in other species when the parapsidal lines are present. Legs dark brown, nearly black, except the femur, which is a clear shining brown. Ungues black. Wings hyaline, subcostal and first transverse veins heavy, others slender, but distinctly defined; all dark dusky brown, almost black. Areolet large, cubitus very slender, in some cases not quite reaching the first transverse. Radial area open and the radial vein straight.

Abdomen clear shining brown; first segment in size equal to the three following taken together. Microscopic hairs on this segment beneath the wings. Sheath of the ovipositor dark brown and with the ventral valves, has fine short hairs along the entire length, but no tuft of these at the point of either, as in most species.

Length: Body, .15, wing .20, antennæ .08.

I first received this species from Mr. William Sutton, of San Francisco, Cal., to whom I am also indebted for other interesting species of

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galls from that section, and I take pleasure in giving to it the name of its discoverer.

CYNIPS Q. NUBILA, n. sp.

Galls: Densely hairy, sub-globular or hemispherical clusters of galls on the under side of leaves of an unknown species of oak; always on the mid-vein. When fresh the hairs are of a fine deep crimson, but fade somewhat in drying. At the base they are yellowish white. The galls in each cluster grow from the same point on the leaf, and the clusters are from one-half to one inch in diameter, and contain from one to five or more galls or larval cells. The cells, denuded of their covering of hairs, are nearly globular, tapering, however, to an obtuse point at the end attached to the leaf, and they measure from three-sixteenths to nearly or quite half an inch in diameter. The shell is about .02 of an inch in thickness (thicker than this at the base, however,) and is very hard and brittle when dry; it contains no larval cell, and its inner surface is slightly roughened as if gnawed.

These galls, in their dense hairiness and in their size and outward appearance, resemble closely those of *C. q. tenuicornis* n. s. from the same locality; but while in this species the larval cells are separate, in *tenuicornis* they are enclosed in an envelope of a dry porous consistence. The fine crimson color, too, seems to be a constant character of *C. q. nubila*, and the insects from the two galls are widely different.

Gall-fly: All females. Head very small, dark reddish brown. Vertex finely punctate or crackled. Ocelli shining, of medium size. Antennæ 13-jointed, rather slender, the base prominent; 1st joint tapering from its abruptly truncate summit; 2nd short, ovoid; 3rd one-fourth longer than the two preceding taken together; 4th equal to the 1st and 2nd; 5th to 8th gradually shorter; 9th to 12th sub-equal; 13th slightly longer than the 12th. The joints, particularly the 3rd, 4th and 5th, closely connected, but with a slight enlargement at the nodes in these last mentioned.

Thorax very dark reddish brown, in certain lights appearing black, covered with very short appressed hairs, which give a slight ashen hue to the surface as seen with the naked eye. Two fine, smooth, rather indistinct parallel lines reach half way from the collare to the scutellum, and two distinct grooves from the collare, converging towards the scutellum and increasing in size as they approach that point. Scutellum distinctly wrinkled or rugose. Legs very dark reddish brown, somewhat shining,

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and paler and sub-translucent at the joints. Wings very large, hyaline. Veins heavy, black. Areolet very small, radial area open, broad. The base of the radial area covered with a dark semi-transparent cloud which includes the 2nd transverse vein. The cubitus in this species, as in *C. q. bella*, is heaviest towards the 1st transverse. At their intersection there is a dark cloudy spot, and a still larger ashen cloud near the tip of the wing This last does not touch the veins nor the margin of the wing.

Abdomen very large, and viewed laterally, nearly circular in outline; 1st segment a little longer than the four following taken together. These last are sub-equal, and each of a deep yellowish brown on the posterior half, but lighter anteriorly. All the light bands, together with the lateral portion of all the segments, covered with minute microscopic hairs. Sheath of the ovipositor small, with a brush of rather long hairs at the apex.

Length: Body .15, wing .20, antennæ .13. This fine and truly remarkable species was collected in the Mule Pass Mts. in Arizona, in Nov., 1879, by Prof. E. T. Cox, to whom I am indebted for many other interesting species.

COENONYMPHA ELKO.

BY W. H. EDWARDS, COALBURGH, W. VA.

Male: Expands .95 to 1 inch.

Upper side pale ochre-yellow, immaculate; fringes concolored.

Under side of primaries nearly same ochre-yellow over basal area and part of disk, limited without by a slightly sinuous and crenated edge of deeper color, much as in the allied species; outside this, slightly ochraceous next inner angle, but yellow-buff over apical area.

Secondaries have the basal area uniform gray-brown, the outline distinct and in strong contrast with the remainder of the wing, which is yellow-buff. Very slightly dusted gray; the outline is irregularly crenated, with a deep sinus on upper sub-costal interspace and another on lower disco-cellular interspace.

Female: Expands 1 inch to 1.02.

Upper side like the male. Beneath, the area just outside the crenated edging on disk of primaries is yellow for a little distance, then tinted

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ochraceous to margin; in one example a minute black dot in the disco-cellular interspace with white centre; in another no dot; secondaries as in the male, the basal area one shade of gray, with distinct crenated outline, and beyond a yellow or buff ground to margin, very little dusted gray.

From 2 ♂ 2 ♀ taken at Elko, Nev., 1880, and sent me by Mr. J. Elwyn Bates, of So. Abington, Mass. Mr. Bates informed me that he had quite a number of examples. The present species is nearly of same color with C. *ampelos* Edw., from Oregon; on upper side a little more yellow, and with less gloss. The under side is much lighter, and on secondaries the contrast between the dark basal area, with its clear cut outline and the pale yellow extra discal area, is great. *Ampelos* has the under side of same general character as *Inornata* Edw. (only different in coloring), from Montana and Winnipeg. *Elko* resembles *Californica* Bois. rather, in which species many examples have the basal area dark and the entire outline of same distinctly defined.

COLLECTION NOTES FOR 1880.

BY JAMES T. BELL, BELLEVILLE.

The early months of 1880 were especially favorable to the acquisition of the hybernating Coleoptera, and those which have their permanent habitat among the moss of our woods and swamps. The early disappearance of the snow laid bare their hiding places, while the frosts which succeeded formed an ice-bridge which gave access to their places of refuge, which in ordinary seasons remain covered with snow till the general break-up of the winter, when they are rendered inacessible by being surrounded or covered with water. Mr. J. D. Evans and myself, who are the sole representatives of the Entomological Society in this district, took advantage of these favorable circumstances and commenced a vigorous course of moss-hunting, lasting from March 1st to May 24th. During this period we collected upwards of 1,000 specimens of over 100 species, of which the following are not included in the Society's published lists. The numbers are those of Crotch's Check List, and the determinations, with few exceptions, were made by Mr. H. Ulke, of Washington, and Mr. E. P. Austin, of Boston.

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7496 Anchus pusillus.
Hydrochus (nova species, Ulke).
1579 Trichopteryx Haldemanni.
" 2 sp. (nova species, Ulke.)
2102*a* Pselaphus longiclavus.
2110 Bryaxis conjuncta.
2120*a* B. propinqua.
2134 Decarthron formiceti.
2139 Arthmius globicollis.
2295 Scydmænus bicolor.
" 2 species not determined.
2366 Latridius deletus.
2572 Atomaria ochracea.
5670 Xanthonia Stevensii.
5771 Plagiodera cochleariæ.
6294 Paratenetus gibbipennis.
9027 Tanysphyrus lemnæ.
9293 Ceutorrhyncus semirufus.
1818 Philonthus palliatus.
7749 Stilicus biarmatus.

All the above were taken from moss, and in addition the following, which are already registered as Canadian: 2095, 2100, 2102, 2103, 2113, 2124, 2130, 2149, 2150, 2164, 2283, 2285, and about 70 species of Carabidæ, Staphylinidæ, Chrysomelidæ, Curculionidæ, etc.

3932 Alaus gorgops; from a stump in Bleecker's Woods.

On June 7th we experienced a heavy gale from the S. W., and on the 12th one of my daughters, who was visiting at West Lake, Prince Edward County, went with a pic-nic party to the Sand Banks, on the shore of Lake Ontario. There she found the beach strewn with Calosomas and other Coleoptera. On her return she brought me 16 *C. scrutator*, 13 *C. Wilcoxi*, 1 *C. frigidum*, and many other beetles. On July 1st, Mr. W. R. Smith being at Brighton, found on the beach at Presq' Isle a similar display of Calosomas, and brought me 14 *C. scrutator*, 24 *C. Wilcoxi*, and 3 *C. frigidum*; unfortunately most of them were spoiled from exposure.

In June I had brought to me a rather fine specimen of *Eacles imperialis*, and a good male of *Xyloryctes satyrus*, both taken within half a mile from the city limits.

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With these exceptions, the season of 1880 has proved the least favorable to the Entomological collector, in this quarter at least, of any I have experienced in my 21 years' residence in Canada. Very few Lepidoptera were seen, either on the wing or at sugar; beating the bushes was singularly unproductive, and I have more than once picked stumps and turned over stones for a full hour without getting 20 specimens of all sorts.

CORRESPONDENCE.

CORRECTIONS.

In the paper on the early stages of *Gracilaria stigmatella*, ante pp. 25–28, occur the following errors, no doubt overlooked by me in the proof: On p. 26, "85 mm." and on p. 27, "8 mm." and "6 mm.," for which respectively read .85 mm., .8 mm. and .6 mm. (fractions instead of integers). And on p. 28, line 13, for "mine" read cocoon.

V. T. CHAMBERS, Covington, Kentucky.

FOOD HABITS OF THE LONGICORNS.

In June, 1873, while collecting in a small swamp on Montreal Mountain, I caught a specimen of *Pogonocherus mixtus* Hald. on my coat-sleeve, and as the insect was new to me, I commenced a search for others. Upon examining a dead branch of a small willow growing close by, I found that it had been extensively bored by some small insect. The part attacked was about three feet from the trunk, and at this place the branch, for about twelve inches, was full of holes from which the insects had escaped. Not finding them, I searched further along the branch, and near its extremity, where it was reduced to the thickness of a twig, I found a number of the above-named species. They were lying on the branch with their bodies pressed closely against it, and in this position could with difficulty be distinguished from the withered buds. I observed several pairs in coitu, but none of the females were ovipositing. They appeared to be very sluggish, lying almost motionless, although the sun was shining brightly at the time. Having bottled all that were to be seen, I cut off the branch where it had been perforated and found a number of the beetles in it, but neither larva nor pupa.

Gaurotes cyanipennis Say.—I find this insect in spring on thorn blossoms, and later in the season pairing and ovipositing on butternut.

F. B. CAULFIELD, Montreal, P. Q.

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DESCRIPTION OF THE PREPARATORY STAGES OF TERIAS NICIPPE, CRAMER.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Long, narrow, fusiform, thickest in the middle, tapering about equally to either end; the two ends nearly equal, small, blunt, the upper one rounded; the sides marked by many low, narrow, longitudinal ribs, about 30 in number; in shape much resembles egg of Colias *Philodice*, but the ribs are more numerous and less prominent, and there are no cross striæ. Color, when first laid, greenish-yellow; after a few hours turning to red. Duration of this stage in midsummer 2 to 3 days.

YOUNG LARVA.—Length .6 inch; cylindrical, nearly even, each segment at its anterior end a little smaller than the posterior end of the next preceding; color whitish, semi-translucent; a few whitish clubbed appendages scattered about each segment; legs and feet color of body; head a little broader than 2, obovoid, greenish-white. To 1st moult in July 2 to 3 days.

After 1st Moult.—Length .16 inch; slender, even, head as broad as 2; color of body deep green; dorsum, the sides and lower parts lighter; each segment transversely crossed four or five times, and on the ridges so caused fine tubercles, some of which put out short clubbed white appendages, others short hairs, white or black; head sub-globose, finely tuberculated and somewhat pilose; yellow-green. To next moult in July 2 days.

After 2nd Moult.—Length .2 inch; same shape; color wholly deep green; head as before, lighter green than body. To next moult in July 2 days.

After 3rd Moult.—Length .4 to .5 inch; same shape; deep green; a darker green vascular medio-dorsal line, the basal ridge pale green from 2 to 13; head as at preceding stage. To next moult 2 days.

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After 4th Moult.—Length .6 to .7 inch; two days later reached maturity.

MATURE LARVA.—Length 1 inch to 1.1; cylindrical, thickest at 2 and 3, and tapering gradually to extremity; the three anterior segments curved down in a circular bend when at rest; dorsal surface pale green, the lower part of sides of a soft whitish-green; each segment creased four or five times, and on the ridges small tubercles, each of which sends out a short white or black hair; along the basal ridge a whitish stripe, most often immaculate, sometimes with an orange patch on each segment, and occasionally an orange line the whole length; under side, feet and legs pale green; head small, sub-globose, very little depressed at top, finely tuberculated, and with a few short fine hairs; color yellow-green. Two days after the moult the larva suspended, and twelve hours later pupated.

CHRYSALIS. Length .8 inch; long, slender, the ventral side greatly produced; head case conical, prolonged to a point, which is a little curved back; mesonotum low, rounded, followed by a slight depression; from this to posterior extremity the dorsum is a little convex; the wing cases cover the ventral prominence, and this is thin, rising to a narrow keel, the sides being a little excavated; from the summit of the keel the slope is regular to head, but posteriorly there is an abrupt curve down to abdomen; a slight ridge upon the side from end to end; color of dorsum pale green or whitish-green, with a darker medio-dorsal line; the wing cases and ventral side of abdomen yellow-green; the side ridges cream-color; so is the ventral carina, but where this approaches the abdomen it becomes brown and the dark color is dilated into an irregular stripe; on either side of head case, and also on lower side of same, are small brown patches, and near base of mesonotum at upper end are two pairs of small brown spots, edged posteriorly with white, the posterior pair the larger; the wing cases with several brown points, part of which are disposed in two rows near to and parallel with the hind margin.

Some chrysalids are quite largely sprinkled with brown dots and patches over whole anterior part, including wing cases, and the keel is brown. Two chrysalids bred in September, 1880, differed from all the rest in that they were black, or black-brown; the anterior parts darkest; one of these had the posterior part of the ventral prominence, beyond the wing cases, dull green; both had the two pairs of spots above mesonotum white. I thought it probable that these chrysalids were diseased, but

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both gave imagos in no way differing from the usual form. Duration of the chrysalis stage in July and August 8 days.

Nicippe is a very common species in this part of West Va. Its food plant is Wild Senna, *Cassia Marilandica*, which grows abundantly, and the butterfly is present in several successive generations and in overlapping broods from early in May to winter. I have seen it on the wing 29th April, and also in December, and am of the opinion that a few individuals successfully hybernate. At almost any time eggs and larvæ can be found on the Senna leaves, many eggs perhaps dotted over the surface of a single leaf and mostly the under surface. On one occasion I noticed a butterfly just from chrysalis standing by its empty shell, on a stem of Senna, and near by were fresh-laid eggs and newly hatched larvæ up to mature larvae. I recorded at the time that there were about forty larvae on one stem. The larvae are very nearly the color of the leaves, and usually may be found, when at rest, lying full length along the mid-rib on upper side.

The butterflies differ much in size and color. The normal color is deep orange, but I have taken males of all grades up to clear sulphur yellow, with no trace of orange. The females also are often nearly yellow, but I have seen none which had not a little orange in the disks.

Nicippe is found over all the Southern and Western States, on the Pacific coast, and so to the tropics, avoiding the highlands. It is common about Pittsburgh, Pa., and is occasional as far to the eastward as Massachusetts. In 1877 I saw a single one flying near the coast, below Boston.

DESCRIPTION OF A NEW SPECIES OF EUDAMUS.

BY J. A. LINTNER.

EUDAMUS ELECTRA, n. sp.

Size of small *Nisoniades Juvenalis*. Primaries narrower than in *Eudamus Pylades* Scudd. ♀, more rounded on the costa, and more oblique on the hind margin. Secondaries rounded, not prolonged at the anal angle as in *E. Pylades*, nor excavated opposite the cell as in most of the Nisoniades.

General color dark brown, approaching that of *E. Pylades;* the fringe concolorous with the terminal portion of the wings, a little paler at their tips.

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Primaries with eleven transparent white spots, upon which an ordinary lens shows regular rows of small black scales—the spots, as follows: Near the end of the cell (apparently open) are two spots, separated by the cellular fold and extending to the enclosing veins (subdorsal and median) —the upper one twice as large as the lower and prolonged backward superiorly in one or two teeth—the lower one subtriangular in shape; above and in line with these two, in cell 10, is a small elongated spot—the smallest on the wing, while beneath them and in range, in cell 2, extending from vein 2 to vein 3, is the largest spot on the wing, enlarged superiorly and excavated inwardly. Outside of this discal band of four spots, are seven others, bordered by dark brown, and arranged in an irregular curve, as follows: in cells 9, 8 and 7, three costo-apical spots, oblique to the costa; outside of these, in cell 6, a spot; in cell 5, still nearer the margin, another; in cell 4, a little farther removed from the margin, another—these last three subtriangular in shape; in cell 3, extending from vein to vein, a subquadrate spot, placed farther from the margin, about equidistant with the lower costo-apical spot; these seven spots, commencing at the costa and omitting the fifth, show a regular increase in size. Outside of these transparent spots, is a series of obscure dark brown intranervular subterminal spots which merge into the dark brown shade of the margin. Inside of these spots, the wing shows by oblique light a purplish reflection approaching a grape bloom but more vivid, with the exception of the internal margin and two brown bands of the color of the outer margin and posterior wings; the bands extend from the subcostal to the internal vein; the outer and broader embraces the discal band of transparent spots in its outer margin, and the other crosses the median vein at its intersection by vein 2; a brown shade rests also on the base of the wing.

Secondaries traversed at about their outer third by a narrow obscure brown band, inside of which the wing is dark brown; outside of this band, the subterminal series of brown spots of the primaries is continued.

Beneath, the purplish reflection of the upper surface appears only at the tip of the wing—the median and basal portions being dark brown, concolorous with the secondaries inside of the paler brown band; the obscure intranervular brown spots of the upper surface are repeated, and continued on the secondaries; the transparent spots are without the lines of brown scales.

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The costal vein of the primaries intersects the costa nearly opposite the end of the cell; vein 8 reaches the margin at the extreme apex—not below it.

Antennæ about one-half the length of the anterior wings, dark reddish-brown, marked inwardly with white at the joints, expanding rapidly into the club (the terminal half of the club lost).

Palpi in length about equal to the diameter of the eyes, clothed with thick, bristly, dark brown hairs, some of which are white tipped; apical joint short, conical, projecting a little beyond the hairs.

Locklet black, curving about half way over the eyes. Front of head dark brown.

Thorax above and beneath clothed with long brown hairs, concolorous with the posterior wings.

Abdomen darker brown, reaching only to the pale band of the hind wings.

Legs dark brown; the posterior pair have the femur and tibia of the same length, bearing brown hairs which nearly equal them in length; tibiæ armed with two pairs of spurs; tarsi twice as long as the tibiæ, moderately spinose.

Expanse of wings, 1.65 in.; length of body 0.55 in.

Described from a single female received from Mr. W. H. Edwards. The specimen was captured in Hamilton, Ontario, by Mr. J. Alston Moffat, in 1877, in company with another like it, which escaped capture.

In the Hesperidæ the antennal club affords excellent generic features. It is unfortunate that in this unique specimen, the half of one antenna and the terminal half of the club of the other, have been lost. It being also of the female sex, we are without knowledge of the presence of a costal fold in this species. In the absence of these characters, it is referred, with some doubt, to the genus Eudamus, in which Dr. Herrich-Schæffer, Dr. Speyer and others arrange species with rounded hind wings and those in which they are greatly prolonged. Of the three groups in which Dr. Speyer has divided the genus, viz., *Hind wings on submedian nervure little or not at all produced,—**Prolonged in a lobe,—***Caudated,—*E. Electra* falls in the first group.

The detection of the above species is a very interesting discovery for this portion of the United States.

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NOTES ON CRAMBUS.

BY A. R. GROTE.

Crambus sericinellus Zeller.

I am indebted to Professor Fernald for specimens of this species from Maine. It appears in two forms; one in which the thorax and fore wings are pure satiny white, which, from Prof. Zeller's description and a specimen sent him for identification, is the typical *sericinellus;* the other, in which the white is somewhat faded, having a slight yellowish or fuscous cast. This latter, Professor Fernald informs me, corresponds to Clemens' type of *inornatellus*, a name which I have referred as a synonym in my preliminary List. It may be retained as a varietal name; I do not think it can be specifically distinct; in some undoubted *sericinellus* the thorax is a little soiled.

Crambus minimellus Robinson.

I have identified this species from a specimen in my collection from Massachusetts. It has very pointed fore wings, and the little species seems to me related to the *Leachellus* group.

Crambus undatus Grote.

This species belongs to the *exsiccatus* group; it is smaller than *exsiccatus*, pale brown, the primaries washed with whitish, and having two dotted transverse lines, angulated on the disc, continuous and very distinct, not drawn in submedially. Fringes brown, with a silky or metallic shade. A fine series of terminal brown dots. Hind wings pale gray, with a faint subterminal line, discontinued inferiorly, visible also beneath. We have two Californian species, *anceps* and *undatus*, and two Eastern species, *exsiccatus* and *laciniellus*, which are allied in having the fore wings crossed by two brownish angulated uneven lines more or less continuous and differing in expression in each species.

Crambus occidentalis Grote.

Mr. Hy. Edwards considers this a distinct species and not a variety of *Leachellus*. It differs by the prominent notch of the white stripe on its lower edge at the middle, and by the dark shades accompanying the stripe below. It is collected about San Francisco. What I regard as the

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same as our Eastern *Leachellus* has been collected by Mr. Edwards at Vancouver and also at Mendocino.

Crambus attenuatus Grote.

This species has been collected about San Francisco. The Californian specimens are a little brighter tinted and slightly exceed in size the material I had before me from Vancouver.

ON A NEW SPECIES OF APHIS AFFECTING THE PINE.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Among our native forest trees, none, unless it is the oak, suffer more from the depredations of insect enemies than the pine. Distributed as it is—from the Arctic to the Tropics—climatologically speaking, it becomes a prey to every conceivable form of insect life.

Already its enemies may be reckoned by hundreds; but notwithstanding this, hardly a year goes by without some careful investigator adding others to the list. It is not the intention of the writer to enter into full details or enumerate all of its foes, but to call the attention of entomologists to a new Aphis affecting a pine in Florida, that has evidently been overlooked by others.

For the past two years we have detected numerous large brown plant-lice upon the common pine of this region, *Pinus australis*, which for want of time we have left unmolested. They cluster together upon the new and tender branches, which they puncture with their remarkably long beaks, causing the sap to exude and the branch upon which they exist to become gummy and sticky. In their habits they are surprisingly shy and timid. On disturbing them they invariably seek safety by hiding between the needles of the pine; indeed, even on hearing approaching footsteps, we have observed them cling closer to the limb, while a few skelter off where the needles are denser.

In looking up literature on the subject, we find several species of Aphides described and mentioned as existing upon pines, but none on *Pinus australis*, nor will any of the descriptions agree with the species under consideration. It belongs to the section *Lachnini* as defined by

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Thomas, and we therefore propose for it the name of *Lachnus australi*, and submit the following description:

LACHNUS AUSTRALI, n. sp.

Wingless ♀ : Length .08 to .16 of an inch. Uniform light brown; head small, eyes large and round, bulging out on each side; beak extremely long and slender, reaching to last ventral segment; antennæ six-jointed, reaching to hinder part of thorax; joints 1 and 2 bead-like; 3rd longest, widest at apex; thorax twice as wide at hinder part as head; abdomen very broad, wider than long, with numerous black spots on top, arranged in transverse rows; nectaries black, tuberculous, nearly obsolete; legs very long, setaceous and black, excepting basal third of tibiæ, which are yellowish.

Winged individual ♂: Blackish, length .08 to .10 of an inch; ala. expanse about .35 of an inch. Head black, punctate, outer margin pale yellowish; prothorax dark brown or blackish, greenish yellow along suture next the head; antennæ short, reaching below middle of thorax; mesothorax is beautifully marked with pruinose bands, starting from each corner of scutellum, which is transverse and pruinose; they curve inwards and meet on top of mesothorax, forming one band which runs straight forwards, dividing again obliquely into two bands to juncture with prothorax; two dots of pruinose on either side of this band; wings hyaline, front pair with a very long, thick stigma, with the third vein remarkably thin and three-branched; hind wings with two oblique veins; abdomen with a dorsal row of whitish or pruinose spots on 5 abdominal segments, also along each side, and 12 brownish subdorsal round spots; under surface uniformly pruinose; legs black, excepting tibiæ, which are partly yellowish; beak long, reaching to last ventral segment, pale in color to near the tip, which is black.

ENEMIES.

We have bred from this species three ichneumon flies, two belonging to the Aphididæ family and one to the Chalcididæ, which we shall describe in a future paper.

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ENTOMOLOGY FOR BEGINNERS.

THE LEGGED MAPLE BORER—Aegeria acerni (Clemens).

BY THE EDITOR.

In 1860 Dr. Clemens described this pretty moth in the Proceedings of the Academy of Natural Sciences, Philadelphia, and since then it has been written on by Mr. P. Gennadius in the *American Naturalist* for January, 1874, and in the same year by C. V. Riley, in his 6th Missouri Report. It is well figured in the accompanying cut, figure 6 (after Riley), in all its stages; *a* shows the larva, *b* the cocoons exposed by removal of the bark, *c* the moth, and *d* the chrysalis.

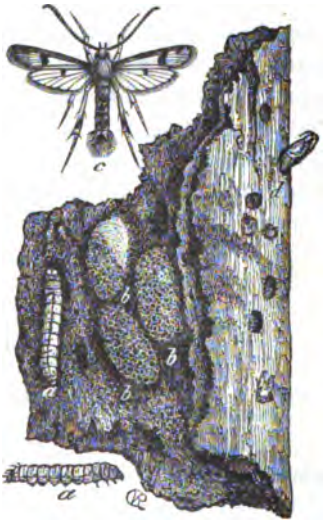

Fig. 6.

The moth appears late in May and during June. When the wings are expanded it measures about three-quarters of an inch across; its wings are transparent, decorated with bluish-black markings. The head and palpi are of a deep reddish-orange, antennae bluish-black, thorax ochreous-yellow, abdomen bluish-black varied with ochreous-yellow and terminated by a tuft of brilliant reddish-orange hairs.

The under side of the body is ochreous-yellow with bluish-black markings.

The female deposits her eggs on the bark of the soft and sugar maple trees, chiefly on the former, and when hatched the young larvae burrow through the bark and feed upon the inner portion and sap wood, never penetrating into the solid heart wood. The excavations made by the larva are filled with its brown castings. When full grown it is more than half an inch long, cylindrical to the eleventh segment, then tapering to the end, with the skin wrinkled and folded. The head is small, of a yellow color, cervical shield paler; stigmata brown; legs and tips of prolegs reddish. When the larva is full grown it eats its way nearly through the

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bark, leaving but a very thin layer unbroken; it then retires within its burrow, and having enclosed itself within a loose, silky cocoon, changes to a brown chrysalis. A short time before the moth escapes the chrysalis wriggles itself forward, and pushing itself against the thin papery-like layer of bark, ruptures it and the chrysalis protrudes as shown in the figure. Soon afterwards the imprisoned moth in its struggles ruptures the chrysalis and escapes.

This insect appears to be increasing in numbers every year, and is very destructive, especially to young maple trees. Many of our shade trees in London are much injured by it, and where very numerous it is liable to completely girdle the tree and kill it. It is also found throughout the Middle States. To prevent the moths from laying their eggs the trunks of the trees should be painted about the first of June with a mixture of soft soap and lye about the thickness of paint, or with a mixture of lime and soap. When once the larvae obtain an entrance it is very difficult to discover them, and they will then carry on their destructive work all through the summer.

PTEROPHORIDÆ.

BY CHARLES FISH, OLD TOWN, MAINE.

About three years ago I commenced the study of the "feather-wings," with the intention of preparing at some future time a monograph of the North American species of this family. While adhering to my original intention, I have decided to so far modify it as to publish in advance certain new species which have accumulated on my hands, and I am induced to this course the more because it may be a considerable time before sufficient material will have been obtained to justify me in publishing my general paper. In the meantime I wish to obtain as many examples of this family as possible from all parts of North America, and any aid that may be given me by collectors I shall try to reciprocate. I prefer to have the examples pinned, but not spread, and great care should be observed in pinning, that the wings be not denuded or the legs broken off. The upper surface of the wings should never be touched with the fingers, nor should the specimens be allowed to roll about in the cyanide bottle and become denuded in this way. The very excellent directions

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given by Prof. Fernald in CAN. ENT., Vol. x., No. 5, for the collection of *Tortricidæ*, will apply equally well to the *Pterophoridæ*.

I desire to express my obligation to Prof. Fernald, who first suggested to me the idea of making a special study of this group, and who has granted me the free use of his valuable private library, and greatly aided me in other ways. I am also much indebted to Prof. P. C. Zeller and Lord Walsingham for aid in determination of species and advice during the prosecution of my studies of this group. To the entomologists and collectors who have assisted me in procuring material I likewise desire to render my thanks. To Mr. Henry Edwards in particular I am under obligation for the loan of his entire private collection in this family, comprising many beautiful species, mostly obtained in California and Oregon.

PLATYPTILUS ALBICANS, n. s.

♀. Head, thorax and palpi cream color. Frontal tuft very short and blunt. Palpi ascending, extending beyond frontal tuft. Antennæ pubescent, banded above with alternate black and white scales, dark brown beneath. Abdomen pale ochreous, cream color at base. Anterior and middle femora and tibiæ cinnamon brown, sprinkled with whitish scales exteriorly, pale cream color interiorly; tarsi dark cinereous, first two joints whitish interiorly. Posterior tibiæ cream color, brownish just before the spurs; tarsi cinereous, whitish at base of joints.

Fore wings cleft one-fourth, creamy white along the inner margin, along the costa broadly cinnamon brown sprinkled with white. Costal triangular patch not sharply defined, cinnamon brown, bordered posteriorly above the fissure by a rather broad white line, but below the fissure its apex is continuous with the brown color of the lower lobe. Both lobes cinnamon brown, more or less sprinkled with white atoms, with a broad white transverse line which does not reach the inner margin of second lobe. Costal cilia concolorous with adjacent portion of wing, white just before the apex, a few brown hairs at the apex. Cilia of fissure white, behind transverse line brown. Cilia of posterior margin whitish, at posterior angle of each lobe brown. Cilia of inner margin whitish. Hind wings cinnamon brown, with concolorous cilia. Third lobe very narrow, linear; cilia pale at base, bearing no dark scales. Underneath, fore wings cinnamon brown, with white transverse line sharply reproduced, also white line at base of first lobe, reaching from costa half-way to base of fissure. First and second lobes of hind wings cinnamon brown, the first

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lobe with a very broad oblique white line near the apex. Third lobe creamy white, somewhat dusted with brown along inner margin on apical half. Alar expanse, 22 mil. Nevada, H. K. Morrison.

PLATYPTILUS EDWARDSII, n. s.

Head, thorax and abdomen ochreous brown. Frontal tuft short and blunt, brown above, whitish beneath. Palpi ascending, extending beyond the frontal tuft, brown above, whitish beneath. Antennæ finely ciliated, obscurely banded above with alternate white and blackish scales, beneath cinereous. Abdomen slender. Legs ochreous brown; hind tibiæ and all the tarsi rather pale.

Fore wings cleft one-fourth. Color reddish ochreous brown, darker on the costa, with a faint sprinkling of whitish scales. Triangular costal patch blackish brown, bordered posteriorly by whitish scales. A small brown patch near the inner margin at the basal fourth, and another near the costa at the basal third; a white transverse line at apical third of the lobes. First lobe before transverse line very dark on the costa, and with a longitudinal dark patch midway between costa and inner margin; second lobe dark at the anal angle. Costal cilia white just behind triangular costal patch and near apex; between, very dark brown. Cilia of fissure white to transverse line, beyond dark brown; on posterior margin white outwardly, brown on basal half, with a marginal line of darker scales at base; at posterior angle wholly brown; on inner margin whitish, with a small patch of dark scales before, and one just behind apex of costal triangle.

Hind wings reddish brown, third lobe with ochreous tinge on inner edge. Cilia brown, with a dark division line at end of first and second lobes. Third lobe linear; cilia of inner margin whitish at base, and bearing a small patch of dark scales just before apex.

Under side of fore wings cinereous brown, ochreous towards apex; transverse line distinct, also white spot on costa behind triangle; triangular patch showing faintly. First lobe of hind wings ochreous, with oblique white line near apex; second lobe cinereous; third lobe with ochreous and white scales mingled.

Alar expanse, ♂ 25–27 mil., ♀ 22–23 mil. Described from 2 ♂ and 3 ♀ taken at Boston, Mass., by Mr. Hy. Edwards, to whom the species is respectfully dedicated; and 5 ♂ and 1 ♀ taken at Amherst, Mass., by Mr. L. W. Goodell.

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ŒDEMATOPHORUS GRATIOSUS, n. s.

Head and palpi rather dark brown, scarcely lighter between antennæ. Antennæ pale brownish, dotted above with white and dark brown scales. Thorax brown gray, anterior portion lighter. Abdomen fawn brown; scales somewhat raised at extremity of segments. Legs grayish brown, spurs concolorous, not tipped with darker color, tarsi pale cinereous, slightly browned at extremities of joints. Middle band of middle tibiæ inconspicuous, consisting of a few raised scales on one side.

Fore wings pale cinereous with dark brown dusting; an oblique brown patch before base of fissure; faint indication of a brown median spot; a longitudinal brown costal spot nearly opposite base of fissure. Cilia concolorous. Hind wings and cilia brownish cinereous, third lobe whitish. Under side of wings dusky cinereous. Alar expanse, 22 mil. California, Mr. Hy. Edwards.

ŒDEMATOPHORUS CINERACEUS, n. s.

Front of head and palpi dark brownish gray, neck dark brown, vertex of head and thorax pale cinereous. Palpi stout, turned upward, third joint very short. Antennæ brownish cinereous, dotted above with dark brown. Abdomen brownish cinereous, somewhat marked with dark brown scales. Legs brownish cinereous dusted on one side more or less with dark brown scales; middle and end band of middle tibiae dark brownish gray; spurs all tipped with dark brown; tarsi whitish cinereous, very slightly browned at extremities of joints.

Fore wings pale cinereous, tinged with brownish, and very thinly dusted with dark brown atoms. These brown scales form a very small median spot, and a somewhat larger one before the base of fissure, bordered posteriorly by whitish. There is a longitudinal brown costal spot opposite base of fissure, two smaller ones towards the apex, and one on inner margin of anterior lobe just before apex. Basal two-thirds of costa only along the very margin dark brown gray. Cilia brownish cinereous. Hind wings and cilia brownish cinereous, darker than fore wings. Under side of wings dark brownish cinereous. Alar expanse, 28 mil. Washington Territory, H. K. Morrison.

ŒDEMATOPHORUS BARONI, n. s.

Front of head and palpi rather dark brown, lighter on the vertex. Palpi rather stout, third joint very short and blunt. Antennae pale

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cinereous, obscurely dotted above on basal portion with dark brown. Thorax and abdomen pale brownish cinereous, the latter marked dorsally by a row of fine black dots, one at the extremity of each segment beyond the third; a few black scales also on the lateral portions. Anterior and middle femora pale brownish cinereous, tibiæ gray, tarsi whitish cinereous. Posterior femora and tibiæ pale brownish cinereous, tarsi whitish; spurs very short, tipped with black.

Fore wings brownish cinereous, with a decidedly ochreous tinge on the inner margin and posterior lobe, the whole surface being thinly dusted with fine black atoms. No other markings. Cilia concolorous with adjacent surface. Hind wings and cilia, as well as under side of wings, dark cinereous.

Alar expanse, 30 mil. California, O. T. Baron, to whom the species is respectfully dedicated.

NEW CYNIPIDAE.

BY H. F. BASSETT, WATERBURY, CT.

(Continued from Page 57.)

CYNIPS Q. POMIFORMIS, n. sp.

Globular, polythalamous galls, sessile on the twigs of *Quercus Agrifolia*, much resembling small round apples except that the apex is not depressed as is usually the case in this fruit. Size from one to two inches in diameter. Color various shades of brown, depending upon the degree of exposure to the sun. The smoothish surface sometimes with a few small, hard, scattered wart-like points. In the larger specimens there are faint lines reaching from the base to the apex, as though it were divided internally by septa; but no such divisions are found. The interior is a rather dense mass of yellowish brown cellular tissue, in which, near the base, lie closely imbedded the thin walled larval cells.

I received these galls last summer from my brother, H. D. Bassett, of San Francisco, Cal. The exact locality where found was not mentioned. The flies began to appear the first of March. They are all females, and judging from the appearance of the galls they seem to belong to the dimorphic class whose cycle of change is completed in one year.

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Gall-fly: Head black, vertex coarsely wrinkled. Ocelli large, black and shining. Antennæ 14-jointed, only two-thirds as long as the body; 1st joint stout, club-shaped; 2nd short, ovate, almost globular; 3rd a little longer than the two preceding taken together; 4th equal to the 1st and 2nd together; 5th to 10th gradually shorter, 11th to 14th very short, sub-equal. Color, clear dark yellowish brown, changing to dusky brown towards the tips. Face black, with fine hairs, broad, but vertically quite narrow. Mandibles black, palpi clear dark shining brown. Thorax black, coarsely rugose, the rugæ crossing and nearly obliterating the parapsidal grooves. These, as far as traceable, are as follows: Two short parallel lines from the collare, one-third the distance to the scutellum; two lines from the collare to the scutellum, closely convergent on the latter. A short, *smooth* line or *ridge* over the base of each wing. Scutellum small, wrinkled; fovae small, indistinct. The entire thorax and legs with fine microscopic hairs. Legs light shining brown, posterior pair much darker. Wings slightly dusky. Veins slender, except the 1st and 2nd transverse, which are heavy, and the latter has a dark cloud at the base of the radial area. The longitudinal veins brown, becoming almost colorless towards the apex of the wings. Areolet small, in some specimens a minute translucent point. Radial area open. Abdomen shining black, 1st segment very long, with white hairs beneath the wings. The posterior edge of all the segments a clear shining brown. Ventral sheath same color. It is very small and the few hairs at and near the tip are microscopic.

Length, body .16, wing .16, antennae .10. Des. from twenty living specimens in my collection.

CYNIPS Q. FICULA, n. sp.

Closely compressed clusters of monothalamous galls, sessile on and surrounding the young branches of *Q. macrocarpa*, forming globular and symmetrical masses sometimes two inches long and an inch and a half in diameter, but usually about one-half this size. The individual galls in these clusters assume a great variety of forms, by reason of the lateral pressure which they exert upon each other. The most common form resembles that of pressed figs, and this species bears a close resemblance to the much smaller one which Dr. Fitch named *C. q. ficus*, but which Mr. Walsh described as *C. q. forticornis*. The normal form would undoubtedly be that of a regular cone attached by its apex to the branch.

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They are when young entirely covered with a rust colored pubescence which mostly disappears from the outward and exposed surface. This outer portion of the gall is somewhat wrinkled and of a dull reddish brown color. The interior is filled with a soft spongy reddish brown substance which is more dense towards the true base of the gall, and where lies the single larval cell. This cell is not separable from the spongy mass surrounding it. These galls were collected last fall in the northern part of Georgia by Mr. W. H. Patton, from whom I received them. They produce only female gall-flies, which I describe as follows :

Gall-fly : A very dark reddish brown throughout. The thorax and abdomen almost black. Head—Vertex finely punctate and with a few short yellowish hairs. Surface of the face entirely concealed by the dense covering of short and closely appressed hairs. Antennae a uniform dark reddish brown, 14-jointed ; 1st joint club-shaped, 2nd regularly ovate, 3rd one-fourth longer than the two preceding taken together, 4th equal in length to the 1st and 2nd together, 5th to 10th gradually shorter, 11th to 14th sub-equal. Surface of the entire thorax concealed by the fine, dense, closely appressed hairiness. Parapsidal grooves—two parallel lines reaching half way from the collare to the scutellum, two slightly diverging lines reaching a little more than half way from the scutellum to the collare, and a smooth line over the base of each wing. Legs of a uniform clear dark reddish brown. Wings large, sub-hyaline, veins dark brown, very distinct but rather slender. Cubitus very slender and disappearing altogether just before reaching the first transverse. Areolet small but well defined. Radial area open, the longitudinal vein bounding its inner edge considerably curved. Abdomen rather small, highly polished and shining, 1st segment with a tuft of yellowish white hairs beneath the wings. Sheath of the ovipositor (in *dry* specimens) projecting beyond the abdomen and covered with coarse yellowish hairs.

Length, body .13, wing .18, antennae .11.

CYNIPS Q. MAMMULA, n. sp.

Galls : Hard woody knots at the base of the young shoots on thrifty young white oak trees, *Q. alba*. They affect both the lateral and terminal branches, and as they are of a hemispherical form, and of large size when compared with the branch which always grows out of their summit, they suggest the name above given. They are polythalamous, and the larval cells are arranged as though the eggs had been deposited around the bud

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before the leaves appeared. The white, thin-walled larval cells are imbedded in woody tissue from which it is almost impossible to detach them. The galls formed around the lateral buds are from one-half to three-fourths of an inch in diameter, but those around the cluster of terminal buds are often an inch in diameter, and instead of a single branch, several are often found growing out of a single gall. They do not seem to affect the growth of the branches the first year, but must seriously injure the tree the following year when the perforated galls begin to decay. This species was very common last year in a thicket which I have searched for galls every season for the last fifteen years without discovering it. The flies are of both sexes and they leave the galls in July.

The flies, of which I have many thousands, may be described as follows:

Female: Head clear yellowish brown; the vertex when highly magnified shows a finely crackled surface. Eyes and ocelli black, the latter very near together. Face rounded and full, with a few short hairs scattered over it, and a brush of long bristly hairs on the mentum. Tips of the mandibles show a faint duskiness. Antennæ 13-jointed, 1st joint club-shaped, abruptly truncate; 2nd small, regularly ovate; 3rd and 4th slender, 3rd a trifle shorter than the two preceding taken together, 4th equals the 1st in length. The first four joints are of a uniform clear yellowish brown, while the remaining ones are of a dull dusky brown; the transition from one shade to the other is abrupt, and not gradual as in most species. The remaining joints are also considerably larger than the third and fourth, and are short and sub-equal, except the last, which is one and a half times the length of the preceding. Thorax dark brown, semi-translucent, the scutellum and post-scutellum almost black. Mesothorax smooth and shining, but highly magnified it appears very finely rugose. Parapsidal grooves absent, scutellum darker and more strongly rugose than the mesothorax. Foveæ wanting. Two anterior pair of legs pale yellowish brown, posterior pair much darker. Wings hyaline. The 1st and 2nd transverse and the subcostal veins rather heavy, and a dark smoky brown. The cubitus disappears about midway between the two transverse veins. Abdomen smooth and shining and apparently black. The first segment one-third longer than the very long second segment, remaining segments short.

Length, body .09, wing .09, antennæ .06.

Male: Entire body a few shades darker than the female. The legs a

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shade lighter. Antennæ 15-jointed, 3rd joint incised. The antennae are much longer than in the female, and the first four joints darker and the remaining ones a little lighter, and the transition less abrupt than in that sex. Abdomen small. The first segment twice as long as the second.

Length (dry specimens), body .07, wing .07, antennae .08.

CYNIPS Q. UTRICULA, n. sp.

Globular, monothalamous galls on the petioles and leaves of *Quercus alba*. Thin-walled, .15 of an inch in diameter, green or purplish, pubescent. Sometimes entirely preventing the development of the leaf, and appearing on the end of the short petiole. Sometimes found on the end of a vein in a partially developed leaf, and more rarely surrounded by the lamina of the leaf. In the last case it appears on both sides of the leaf, but is most prominent above. It contains no larval cell. In size and in structure it resembles *C. q. vesicula* found on the same oak, but it is several weeks later and the insects differ materially.

The flies appear early in June, and are of both sexes.

Female: Head black, very finely wrinkled, face sparsely covered with short stiff hairs. Antennae 13-jointed; 1st short, club-shaped; 2nd globular, 3rd long and straight, 4th three-fourths as long as the 3rd; 5th and succeeding ones, except the terminal one, one-half as long as the 3rd; 13th long and with an indistinct suture in the middle. Color clear yellowish brown at the base, gradually changing to dull deep brown at the tip. Thorax black. Mesothorax finely rugose. Parapsidal lines distinct, and a broad, deep median line from the collare to the scutellum. Line over the base of each wing present but indistinct. Scutellum coarsely wrinkled, sparsely hairy. Fovae connate, deep, smooth and shining at the bottom. Legs, two anterior pairs yellowish brown, except the trochanter, which is nearly black. Posterior pair darker brown.

Abdomen black, shining. Sheath of the ovipositor with short hairs at the tip. It turns upward and extends above the dorsum as in *C. q. operator*. Wings hyaline. The subcostal and the 1st and 2nd transverse veins shining brown, rather heavy, the others quite pale. The cubitus does not reach quite to the 1st transverse.

Areolet very small, and in some cases wanting. Radial area open. Surface of the wing more hairy than is usual among the Cynipidae. Length (dry) .10.

Male: Black, except the legs and the antennae, which are a little darker than the female. Antennae much longer than the female, 15-

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jointed, *3rd joint not incised.* Abdomen small, slender, shining. First segment equal in length to all the others. Length (dry) .08.

This species is often quite abundant in the limited space where I have found it. In describing the galls I should have added that the larva is not enclosed in a larval cell.

Habitat—Conn.

LIMENITIS EROS VERSUS VAR. FLORIDENSIS.

BY THEODORE L. MEAD, NEW YORK.

Among the generally accepted canons of nomenclature is the rule that if a description includes two or more species, it shall be valid for neither as against subsequent authors who discriminate the forms properly.

While all of us may not be willing to push this rule to its limit and reject the first name altogether, it certainly is a wholesome restriction against a custom which has prevailed in some quarters, notably in France, of making loose and indefinite descriptions, waiting until some more careful writer has separated one of the forms as distinct and named it, and then declaring that the latter was the species really intended by the indefinite description, thus at one stroke of the pen creating a synonym and finding a new species to be named.

It seems to me that Mr. Strecker's reclamation as to *Limenitis* var. *Floridensis* and *L. Eros*, on page 29, is of this nature.

He speaks of his Limenitis as "the form found in the extreme south." Now there is a darker form of *Lim. Misippus* at the south—some specimens from West Virginia show a darker color than those from the Catskills; in Texas and even in Southern Illinois specimens are found of a deep mahogany color. This is the "southern form" of *Misippus* which differs notably from *Eros* in the absence of the white band on under side, to which the mention of v. *Floridensis* does not allude. This mention, it seems to me, is too brief and indefinite to rank as a description, especially as the names have now been fixed by careful descriptions and the *status* of *Eros* established as a distinct species.

The New York Entomological Club has a committee whose duty it is to consider cases of disputed nomenclature; their decision, when ratified, of course carries only the weight due to the unanimous opinion of the entomologists composing the Club. But this is a gain over the unorganized

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expression of individual opinion, and it seems to me that this example might very profitably be followed by other similar societies.

I am authorized to state that this committee unanimously sustain the name of *Eros* Edw. as applied to the dark species, and *Floridensis* Streck. as applying to the dark variety of *L. Misippus* which ranges from Illinois to Florida.

CORRESPONDENCE.

ON THE USE OF THE FORCEPS OF FORFICULA.

I just happen to hit upon Dr. J. G. Morris's article on the functions of the forceps of Forficula (Can. Entom. 1877, p. 218), and it reminds me of a statement on the same subject in E. Newman's "Zoologist," 1850, p. 2,695, which however differs in its details, and deserves therefore to be reproduced here. The article is signed: John Williams, Royal Astronomical Society, Somerset House; the insect was *Labia minor*, and the principal passage runs thus: "Upon arriving at the highest point it "could attain (on a book upon which it had alighted) the insect stood "quite still and raised the elytra; it then, with a very quick motion, thrust "the point of one of the caudal appendages, close to the body, under the "wing, which was unfolded by its agency; this being repeated on the "other side, both wings were fully expanded and the insect briskly flew "away, etc." According to Mr. Morris, the insect *lifted up the short elytra with his forceps, before the wings would expand.* Both passages may perhaps be reconciled, only the former is more explicit in the statement that it is *the wing* which requires the help of the forceps in expanding.

C. R. Osten Sacken, Heidelberg, Germany.

The determination of *Alaus* published by Mr. J. T. Bell, on p. 59 of your last issue (xiii., No. 3) as *gorgops* is perhaps erroneous. I know that species (the older name of which is *lusciosus* Hope, v. Crotch List, Suppl. 27) from no locality north of the western part of Louisiana and Texas. The Canadian form *must* be *A. oculatus.*

In this connection, I would observe that a determination unless as authentic as possible, is liable to produce serious error if published as a contribution to a faunal list.

J. L. LeConte.

Philadelphia, March 28th, 1881.

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The Canadian Entomologist.

VOL. XIII. LONDON, ONT., MAY, 1881. No. 5

DESCRIPTION OF THE PREPARATORY STAGES OF APATURA FLORA, Edw.

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg.—Similar to egg of *Clyton;* nearly spherical, flattened at base, marked by 18 or 20 slightly prominent vertical ribs, and by many fine equi-distant striæ ; color yellow-green. Duration of this stage 6 to 7 days.

Young Larva.—Length .8 inch ; cylindrical, tapering from segment 3 ; pubescent ; color pale green, translucent; head twice as broad as next segment, sub-globose, bilobed, the surface thickly pitted with shallow excavations ; color shining yellow or ochrey-brown. Towards the last of the stage the body is less tapering, each segment well rounded; down middle of dorsum from 2 to 13 a dark green line, and another on upper part of each side, the dorsal area between these side lines whitish-green ; below the lines more decidedly green ; legs and feet green. To first moult 6 days.

After 1st Moult.—Length .14 inch ; body a little thickest at 7, tapering slightly either way, the last segment ending in a forked tail ; the surface closely covered with yellow and yellow-white tubercles, arranged in longitudinal rows, and also in regular cross rows ; these tubercles are stout at base, subconic at top, of irregular sizes, and at top of each is a short white appendage ; on middle of dorsum a dark green stripe, and another, but narrower, on upper part of side ; the dorsum is covered by two bands of tubercles, divided by the green stripe, each band made up of two rows, the outer row being whitish, the inner yellow ; below the lateral stripe is another band of two rows, and as the stage proceeds these separate, showing a dull green line between them, the lower row running with the basal ridge of body ; the tails are divergent from base, are short, tapering, rough with tubercles, and these gave out longer hairs than elsewhere ; under side, feet and legs yellow-green ; head subquadrate, the sides rounded, the front a little rounded, the top incurved ; whole surface

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shallowly pitted and covered with a short yellow down; color greenish-white, with dark brown spots and patches; a large brown triangle over mandibles, a small sub-triangular patch at top in the depression, a sub-crescent patch along base of each vertex, and a stripe from vertex half way down side, another down the back; the ocelli black on brown ground; on each vertex a short, compressed, fleshy, white process, and single white spurs along back of head at top and down sides; on the sides and tops of the processes and spurs many long white hairs. To next moult, 4 days.

After 2nd Moult.—Length .26 inch; similar shape, stouter, the sides somewhat less rounded than dorsum, the base broadest; the tails more produced; the tubercles as at next previous stage, white and yellow, but broader and flattened; the two rows of each dorsal band a little separated so as to show a dull green imperfect line; the side stripe much widened; segment 2 wholly yellow; head shaped as before, the depression more angular, green behind, green with dark brown patches at sides and front; these patches much extended, the one at top nearly meeting by a triangular projection the triangle from mandibles, and the one from base of process in nearly all cases protracted to outer end of mandibles, so that the white in front is confined to two curved vertical stripes forming with a cross line between the two triangles the letter H, each upright, incurved; the processes stout, short, cylindrical, evenly forked at top, each fork bluntly rounded, and a little tapering; at the base is a spur turned forwards, and along the back and sides are single spurs; color of process black in front, green behind; along back of head at top spurs in line, and so down the sides, diminishing gradually in length, the upper ones bent down; all as well as the processes pilose. To next moult 3 days.

After 3rd Moult.—Length .38 to .4 inch; stouter, the back more arched; marked as before; head almost precisely as before. To next (last) moult 5 days.

After 4th Moult.—Length .6 inch, greatest breadth .14 inch; same shape as at close of last stage and banded in same way, viz., a narrow dark green medio-dorsal stripe; a broad upper lateral yellow-green stripe, a lower lateral one of same color; the tuberculated bands on dorsum each divided by a medium yellow-green stripe, not so clear or uninterrupted as the others; the inner row of each band is quite narrow and is yellow, the outer row is wider and white; below the upper lateral stripe

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is a yellow row, and a yellow and wavy one runs along the ridge, at base; these two side bands unite at 4 or 3 and go to head as one broad band.

Six days after 4th moult the larva reached maturity, and two days later suspended.

MATURE LARVA.—Length 1.2 ♂, 1.4 ♀; greatest breadth .18 ♂, .2 ♀; body sub-cylindrical, obese, in some cases almost same thickness from 2 to 8, then tapering rapidly to end, in others the middle segment is thickest and the taper is regular either way, 2 being of equal diameter with 12; the dorsum well rounded, the sides much less convex, rather flattened, and sloping to a broad base; the last segment ending in a forked tail; banded with tubercles as immediately after the moult, but these have constantly diminished in size as the larva progressed, and in no place are so distinct, and many have disappeared altogether; general color either bright yellow or ochre yellow, a little whitened along the edges of dorsal area; the medio-dorsal stripe is very narrow and either black or deep blue, but greenish on two or three anterior segments; the two side stripes are dull or sordid green, as is also the under side; feet and legs same; head .06 inch broad, .07 high, sub-quadrate, the sides rounded, the front moderately rounded, the top depressed at a slight angle; on each vertex a short, stout stag-horn process, with two equal prongs at top, one in front at base, another near the base on the front inner side, making four prongs which are of same shape, tapering to a blunt rounded top, and these and the entire front and sides of the process are black; the back is green, and upon it and at the sides below are four green similar prongs; along the back of head, at top and down the sides are several greenish-white slender spurs, the upper ones long, those on sides diminishing in length as they descend, and bent down; on the front four small knobs, two below horns towards the suture, two at side; the back of head green, the rest greenish-white and black, and thickly covered with a fine yellow down; the processes and spurs much covered with quite long white hairs; the entire surface of head shallowly pitted; in nearly all cases the pattern of face is as in the preceding stages, the top being black, and projecting over front and sides black sub-triangular or long patches; and also a black triangle resting on the black patch which covers the mandibles; the white area being restricted to four vertical stripes, two of them incurved on middle front, making the letter H, the uprights reaching from vertices to ends of mandibles, a narrow space between the two front triangles making a cross

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bar; the other two being on the sides; but in many cases the white is much restricted on the front, there being merely two short bars on lower face; one example differed from all the rest, the face being largely white, the black tip and patches merely indicated by gray of the palest shade, the only black being in a small spot over mandibles; in all cases the mandibles and ocelli are black.

CHRYSALIS.—Length .7 ♂, .85 ♀; compressed laterally, the outline of ventral side convex, a regular curve from top of head case to end of wing cases; the abdomen prominent dorsally, much arched, sharply carinated, the sides very little convex and near the keel slightly incurved; the anterior edge of each segment on the keel a little produced and thickened, and marked on either side here by a shining black dot; the thoracic segments depressed at an angle of about 45° above the end of the keel, and their sides excavated; mesonotum low, rounded at summit, with a slight carina, the sides convex; the head case subconic, the ocellar projections prominent, three sided and running to a blunt point, the space between them on top of head being concave; from end of each a small ridge runs back, the two ridges meeting at base of mesonotum, the intervening area being almost flat, very little convex; color pale yellow-green, finely streaked and specked with light buff over head case, mesonotum and wing cases, and specked over abdomen; the neuration of the wings distinct in pale yellow or buff; a buff line passes along the keel and mesonotum, and forks to the projections of head case; another passes along the posterior edge of the wing case and is joined by a wavy line down side of abdomen; on middle of each abdominal segment on dorsal side is an oblique faint buff line pointing down and forwards, ending in a little buff spot. Duration of this stage 6 and 7 days.

In Butterflies of N. A., Vol. 2, Part 5, I described *A. Flora* as a "possible variety of *A. Clyton*," but expressed the opinion that it would be thereafter found to be a good species. The few examples then known to me were all collected by the son of the late Mr. Wm. Stadlmair, of Brooklyn, N. Y., at Pilatka, Fla., and were accompanied by undoubted *Clyton*. In 1880, I received from Dr. Wm. Wissfeld a female *Flora* taken at Indian River, and I urged him, in case he was so fortunate as to capture another female, to tie it in a bag over a branch of any species of Celtis tree. On 20th July, I received about 50 young larvæ, from eggs laid 11th July. A female had laid about 225 in a cluster within bag on

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leaves of Celtis integerifolia, and on 12th, part of these were forwarded to me by mail in a tin box, arriving in good order, because the leaves had not lost their freshness, though 8 days on the road in the heat of July. I gave the larvæ Celtis occidentalis leaves, which they took to readily, and I had no difficulty in raising several of them to maturity. . The first stage was about one half over when I received these larvæ, and four days afterward the first moult took place. The habits of the larvæ were similar to those of *Clyton*, during the early stages gathering in dense clusters and resting for long intervals, during the later stages separating and concealing themselves by stitching together two or three leaves. *Clyton*, in W. Va., unlike *A. Celtis*, has no second brood, and all the larvæ hybernate after passing the 2nd moult. In the spring they pass three additional moults, making five in all. *Flora* passed but four moults, like the summer generation of *A. Celtis*, and none of the larvæ hybernated. The butterflies began to emerge from chrysalis 22nd Aug., and continued doing so till 31st, by which time I had 4 ♂, 6 ♀. No examples of *Clyton* were at any time received last year from Indian River, and probably it does not inhabit that locality.

NOTES ON SCIOMYZIDAE WITH DESCRIPTIONS OF NEW SPECIES.

BY DR. L. T. DAY, NEW HAVEN, CONN.

Tetanocera clara Lw. Mass., Conn. Specimens of this species with typical frontal markings, have the posterior transverse vein nearly straight and perpendicular, as in *valida*. In a single specimen there is an incomplete brownish-black abdominal stripe, interrupted at the incisures.

Tet. pictipes Lw. Conn., Pa., Kansas, Wash. Ter. Specimens from Wash. Ter. are larger and more melanized than the New England species. Nearly the whole front is occupied by a blackish-brown quadrangular spot, leaving a yellowish border laterally and anteriorly.

Tet. combinata var. *sparsa* (Lw.) Mass., Conn., Pa. From the examination of a large number of specimens of both forms, chiefly collected by Dr. Williston, I am satisfied that *sparsa* can not be specifically

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separated from *combinata*. In none of my specimens do I find the polished frontal stripe narrowed anteriorly, and yet in some the brown spots form very distinct double bands running across the wing. I find the antepenultimate band to run as frequently before as over the posterior transverse vein. Again, in those specimens with the double-band arrangement of the brown spots on the wings, I find the tibiæ in more than two-thirds not darker than the femora. In some of the specimens there is only a feeble attempt at double bands; even in single specimens I find both double and single bands, showing an unusual degree of variation for species of this genus.

TET. PUBESCENS, sp. nov. 1 ♂ ♀. Third joint of the antennæ shorter than the second, excised, bristle white pubescent, wings reticulated, with narrow costal border, posterior transverse vein but slightly curved and nearly perpendicular, tips of tarsi black. Long. corp. 7 mm. Long. al. 6.5 mm.

Yellowish-brown, somewhat tinged with reddish. Front yellow, with the middle stripe broad, excavated and polished, widening somewhat anteriorly; on each side near the orbit is a small black dot, and more anteriorly a second larger one between the antennæ and the anterior corner of the orbit. Antennæ reddish-yellow, with the third joint shorter than the second, distinctly excised above and somewhat pointed; the second joint very broad, the upper border thickly studded with stout hairs, the under border with finer hairs. Antennal bristle slightly yellowish at the base and covered with a whitish pubescence. Face with white reflection and considerably receding. Dorsum of the thorax with two stripes dusted with white and bordered with brownish streaks, enclosing a rather narrow median yellowish stripe; lateral borders dusted with yellowish. Superior part of the pleuræ with a brownish-red longitudinal stripe extending to beneath the halteres. Scutellum somewhat lighter than the thorax. Abdomen yellowish-brown, with narrow brownish median stripe interrupted at the incisures. Legs yellowish; tarsi tipped with black. Surface of the wings yellowish, with the margin of the costal border black, extending from the stigma to the fourth longitudinal vein. There are five or six small clear spots on the anterior margin of the second longitudinal vein; the remainder of the reticulation similar to, but coarser and less distinct than in *saratogensis*, consisting of narrow longitudinal stripes bordered by small transverse spots, arranged for the greater part in pairs. The anterior transverse vein is near the middle of the discal cell;

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the posterior transverse vein is slightly curved and almost perpendicular.

Hab. Washington Territory, H. K. Morrison. This species is most nearly related to *saratogensis*, but differs in the greater size of the second joint of the antennæ, and the long hairs or bristles above; the narrower costal border and sparser reticulation of the wings, and the blackened tips of the tarsi.

Tet. plebeja Lw. Specimens from Washington Territory agree closely with this common Eastern species. The median abdominal stripe is however more distinct, and there is a feeble indication of a double curvature in the posterior transverse vein.

Tet. plumosa Lw. The most common species of this genus in Connecticut. This species runs so closely to the preceding that it is sometimes extremely difficult to distinguish them. The posterior cross vein shows a considerable variation in its shape, as do the frontal markings.

TET. MONTANA sp. nov. ♀. Third joint of the antennæ obtuse, short, not distinctly excised, bristles plumose with black, wings greyish, unicolorous, posterior cross vein feebly bi-arcuated. Long. corp. 8.5 mm. Long. al. 7 mm.

Acorn colored. Front golden yellow, with a narrow distinct reddish median furrow, the black spot near the orbit wanting, but a reddish spot between the base of the antennæ and anterior corner of the orbit. Antennæ reddish-yellow, first two joints thickly covered with black hairs, third joint not longer than the second, and not distinctly excised above; bristle of the antennæ plumose with black. Face perceptibly lighter than the front, and by reflected light with a golden glisten. Occiput without distinct white spot. Thorax with a very distinct median, longitudinal stripe, bordered with a dusky line; also two narrow, less distinct, and interrupted stripes on each side; thorax covered with numerous short black hairs. Pleuræ distinct chestnut, and somewhat pollinose with gray. Abdomen unicolorous and thickly covered with black hairs; a narrow dark median stripe interrupted at the incisures; sides dusted with grey. Legs luteous; anterior femora darker than the middle and posterior, hind femora with a single long bristle on the under side in front; three last joints of anterior, two of middle and posterior tarsi black. Wings broad, not reticulated, of a uniform greyish or blackish tint; posterior transverse

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vein very slightly bi-arcuated and sub-perpendicular; both transverse veins narrowly bordered with brownish-black.

Hab. Wyoming, June, Dr. Williston.

TET. LINEATA, sp. nov., ♀. Bristles of the antennæ nearly bare, wings not reticulated, posterior transverse vein very strongly doubly curved, so that the middle half is parallel to the fourth longitudinal vein. Long. corp. 6 mm. Long. al. 5 mm.

Pale brownish. Front obscure yellowish, with the median polished stripe tapering anteriorly; on each side near the orbit is a small reddish spot, and more anteriorly, between the base of the antennæ and anterior corner of the orbit, a larger reddish spot with a dark centre. Antennæ nearly the color of the front, the second joint covered with small black hairs, the third joint as long as second, scarcely excised and obtuse; basal half of the bristle concolorous with the antennæ, terminal half slender, whitish, and microscopically pubescent. Face gently receding, light yellowish. Thorax with a median reddish-brown stripe extending over the scutellum, divided in its anterior part by a narrow whitish line; on each side a stripe dusted with white extending over the side of the scutellum; laterally on each side there is another irregular brownish-red stripe bordered by whitish in front of the wings. Pleuræ with brownish stripe, extending to beneath the poisers. Abdomen brown with paler lateral borders and narrow posterior margins of the segments. Legs obscurely yellowish-brown, hind femora with a number of short spine-like bristles underneath the distal halves; tarsi blackened towards their tips. Wings yellowish-hyaline, with irregular brownish clouds in the end of the submarginal, most of the first posterior and middle of discal cells; posterior margin of the wing greyish. Transverse veins clouded with brown, the posterior one strongly curved, its middle portion parallel to the fourth, and its terminal portions perpendicular to the fourth and fifth longitudinal veins.

Hab. Connecticut, Dr. Williston.

An easily recognizable species with characters approaching somewhat the genus *Sepedon*.

Sepedon fuscipennis Lw. Specimens from Washington Territory cannot be distinguished from New England ones. In all, the lateral frontal spots are more commonly absent, and the tarsi may show but a faint degree of blackening in their ground color. Long. corp. 5.5–8 mm.

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Dryomyza pallida, sp. nov. Polished, pale yellow, bristle of the antennæ slender, sparsely pubescent with black near the base, thorax striped, wings pubescent, hyaline, first longitudinal vein clothed with hairs. Long. corp. 8 mm. Long. al. 8 mm.

Pale yellow, shining. Front deeper yellow, opaque, with the short pubescence and bristles black. Antennæ incumbent, reddish; second joint short, third about twice as long as wide, oval; bristle slender, the distal end bare, the proximal sparsely pubescent with black. Thorax yellow, with two narrow median stripes of a brownish tinge; on each side and posteriorly there are about ten black bristles. Scutellum with four black bristles. Pleuræ with narrow distinct brownish lines extending from the root of the wings to the humeri; just below and in front of the tegulæ is a small oval black spot. Abdomen pallid, yellow, and darkened toward the tip, shining, covered with rather long, fine black hairs. Legs pale yellow, with black hairs; last two joints of all the tarsi black; tip of middle tibial, and first three joints of middle tarsi, with a short brush of golden pile. Wings pubescent, hyaline. The first longitudinal vein distinctly hairy, the third bare; posterior transverse vein straight and perpendicular; both transverse veins bordered with black, as is also more narrowly the termination of the fourth longitudinal.

Hab. Connecticut, May.

This species is easily distinguished from the other American species already described by the hairy first longitudinal vein.

My thanks are due to Dr. S. W. Williston for the examination of his excellent collections in this family.

ON A GIGANTIC CHALCID FLY INHABITING FLORIDA.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

In the spring of 1880, while collecting Coleoptera, I secured a ♀ of a large species of Chalcid belonging to the genus *Smicra*, which is apparently unknown to the scientific world.

The specimen was captured on an oak shrub, in close proximity to an empty *polyphemus* cocoon. Could it have hatched from it? This is not improbable, as Prof. C. V. Riley's *Smicra mariæ* was bred from this moth.

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and other species of the genus are known to be parasitic upon the larvæ of our larger moths.

For want of a good scientific library of my own, and there being none in the State, I was unable to look up the species until recently, and as I fail to find any description that will agree with it, either in size, coloration, &c., I submit the following:

SMICRA GIGANTEA, n. sp.

♀. Length .43 of an inch.

Head, antennæ and thorax black, opaque. Head and thorax coarsely and strongly punctate, antennæ more finely punctate; eyes greenish red; collare somewhat bulging at sides, praescutum triangularly elongated posteriorly; scutum rather large, bulging; scutellum convex, rounded off posteriorly, punctate; abdomen rather abruptly produced into a long sharp point, the thick globular basal portion being a shining brownish red; basal half of segment next the peduncle longitudinally grooved, the grooves being deepest at base and shallowing off at middle of segment; the pointed part of abdomen black or brownish black, a few short whitish hairs scattered promiscuously over abdomen; wings hyaline fuscous, veins black; anterior and middle coxæ brownish red; femorae brownish black; tibiae and feet lighter; posterior coxae and femorale brownish red, smooth and polished, coxae slightly punctate, the swollen femorale toothed beneath where tibiae rest when drawn up, the latter brownish black; tarsi and feet reddish brown.

NORTH AMERICAN NOCTUIDAE IN THE ZUTRAEGE.—FOURTH AND FIFTH HUNDREDS.

BY A. R. GROTE.

Oria sanguinea, 9, fig. 613–614.

"Georgia." This species has been generally recognized. *Oria* is used for *maculosa* in the Verzeichniss, from which *sanguinea* is distinct structurally. I have referred the latter as the type of *Porrima* in the Check List, No. 664. The doubtful reference there to Fitch's *volupia* must be struck out.

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Epizeuxis lubricalis, 19, figs. 665–666.

"Java." I have considered that the locality is erroneous and that this undoubtedly represents *Helia phealis* Guen., a common species throughout the U. S. and California.

Dyachrisia balluca, 22, fig. 681–682.

"Georgia." The figures are excellent representations of our not uncommon *Plusia balluca* from Canada and the Middle and Eastern States.

Trigonophora frugiperda, 22, figs. 683–684.

Geyer refers to Abbot and Smith as authority for the species. It is without doubt the *Laphygma frugiperda* of Gueneé, a common and destructive Southern and Western species re-described by Prof. Riley in the Missouri Reports as *Prodenéa autumnalis*.

Aedia limbolaris, 23, fig. 689–690.

"Georgia." I have taken this species about Buffalo, N. Y.

Antiblemma flavipunctalis, 25, fig. 701–702.

"Java." Also with *lubricalis*, from M. de Luxerre, and probably American. It represents a female allied to *Renia pastoralis* Grote, which seems to differ only from *Renia Belfragei*, a common species, in the yellow stigmata. I have two males colored more darkly than *pastoralis* and agreeing in this respect more nearly with Geyer's figure. I have labeled these *flavipunctalis* in my collection; but the distinctness of the three forms is not fully made out.

Autographa oxygramma, 37, fig. 769–770.

"Georgia." Gueneé refers this Southern species to *Plusia*, Noct. 2,350.

Agriphila bistriaris, 38, fig. 775–776.

"North America." I believe this is *Doryodes acutaria* H.-S., and have so referred it Bull. U. S. Geol. Survey, 179, 1878.

Exarnis difflua, 9, figs. 821–822.

"Labrador." Staudinger refers this as a synonym of *exulis*, Cat. Eur., 100.

Clytie liburna, 40, fig. 963–964.

"North America." This is without doubt the species afterwards described by Gueneé as *Scolecocampa ligni*. The red-brown shading on the reniform is not so bright as Geyer figures it. I have made this identification in my List of the Noctuidæ of North America, p. 20.

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Acolasia hirta, 41, fig. 971-972.

"Georgia." A ♀ specimen sent me through Mr. v. Meske from Texas (coll. Heiligbrodt) seems to belong to this species. It is less distinctly marked than the figure, else nearly resembles it.

Carl Geyer is to be regarded as authority for the species in these fourth and fifth Hundreds, concluding the work. The date of the first Hundred is 1818; of the second, 1823; third, 1825; fourth, 1832; fifth, 1837. The total number of figures is 1,000, each example being figured in two positions separately numbered; each Hundred contains two hundred figures.

NEW CYNIPIDAE.

BY H. F. BASSETT, WATERBURY, CT.

(Continued from Page 79.)

CYNIPS TENUICORNIS, n. sp.

Galls: Densely hairy hemispherical masses attached by a single small point to the upper or under surface of the leaves of an unknown species of oak found in Arizona. They are from one-half to three-fourths of an inch in diameter. One specimen in my collection is nearly globular, but all the others are hemispherical, the flat side lying close upon the surface of the leaf. The woolly hairs are of a dull russet color and entirely hide the polythalamous gall beneath. Denuded of the hairs the surface of the gall is uneven, and beneath the slight protuberances lie the larval cells. The shell or rind is brittle, and when dry crumbles easily. The inside is nearly filled by the small and extremely thin-walled larval cells. Between these there are a few thin fibrous plates or lamina with open spaces. A gall of average size contained fourteen larval cells.

Gall-flies: All females. Head black, vertex finely rugose or punctate. Ocelli rather large; the middle one lies in a smooth shallow groove which extends from the posterior margin of the vertex nearly to the base of the antennae, and is broader behind than before. Face microscopically wrinkled and hairy. Antennae 14-jointed, extremely slender or thread-like; 1st and 2nd joints short and comparatively stout. the 2nd nearly as

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long as the 1st, both of a clear dark amber color. Color of the remaining joints dark brown; 3rd joint equal in length to the first two: 4th, 5th and 6th gradually shorter, the remaining ones sub-equal. All except the first two closely connate. Thorax black, finely and evenly crackled. Parapsidal grooves only two. These are sharply defined but remarkably narrow, and widely separated on the collare, but closely convergent on the scutellum. Scutellum more coarsely and less evenly crackled, but in other respects like the mesothorax, from which it is separated by an extremely fine line or groove. Fovae absent. There are on the scutellum, also on the mesothorax between the base of the wings, and on the head, a very few microscopic hairs. Legs clear dark amber or yellowish brown. Tarsi darker brown. Abdomen olive brown with paler transverse bands; 1st segment half broader than the 2nd, and with a few very fine hairs on the sides beneath the wings. All the segments, except a narrow border on the anterior edge of each, with an extremely fine punctation that gives to them when highly magnified the opaque effect seen in ground glass. Sheath of the ovipositor short with a minute tuft of hairs at the tip. Ventral valves extending to the extremity of the abdomen. These, with the sheath of the ovipositor, darker than the rest of the abdomen.

Wings hyaline, medium size. Veins small, dark brown, or black towards the base, lighter at the apex of the wing. Areolet medium size, bounded by equal veins, cubitus disappearing a short distance from the 1st transverse. Radial area open, long and narrow.

Length, body .11, wing .12, antennae .08.

Galls collected in the Mule Pass Mts. in Arizona, in Nov., 1879, by Prof. E. T. Cox.

CYNIPS BELLA, n. sp.

Galls: These belong to the class known as oak-apples. They are attached by a minute sessile point to the under side of the leaves of an oak found in Arizona—often near the margin of the leaf, but more commonly on or near the mid-vein. They are perfectly round, and those that have escaped the attack of parasites are quite uniform in size, measuring from ¾ to ⅞ of an inch in diameter. Those stung by parasites are generally much smaller, and this species is so subject to their attacks that more than three-fourths are thus affected. The galls (when dry) are of various shades of brown, mostly smooth but not polished; a few specimens have a decidedly russet color and a rough surface. The shell very thin and

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brittle. Each gall contains a single larval cell which is kept in a central position by fine, silky, radiating fibres that reach from it to the outside covering. Besides these fibres, there are others that are attached to the inner surface of the shell, but which are not attached to the larval cell. They are much finer than the others and resemble coarse wool. Except that these galls are smaller, and the internal structure more delicate, and the surface less smooth and polished, they might easily be taken for those found on *Quercus rubra* –*C. inanis.*

Gall-flies: All females. Head brownish black, very small, though transversely very broad. Vertex microscopically wrinkled. Eyes rather narrowly oval. Ocelli large, black and shining. Head and face covered with fine downy hairs. Antennæ short, slender, hairy, shining reddish brown, darker towards the tips, fourteen-jointed; 1st joint large, club-shaped or ovoid with the upper end truncate and hollowed to receive the globular 2nd joint; 3rd one-fourth longer than the first two taken together; 4th equal to the 1st and 2nd; 5th to the 9th gradually decreasing in length, 10th to 14th very short, scarcely longer than broad. Thorax covered with bright shining hairs. Parapsidal grooves: Two parallel lines extending from the collare three-fourths the distance to the scutellum. Two diverging lines reaching from the scutellum to the collare. These are much nearer together at their starting point on the scutellum than is usual in the genus *Cynips.* There is the usual short line over the base of each wing. (All the above markings of the mesothorax are found in most of our one-gendered species—not in all, however.) The posterior limit of the two parallel lines vanishes in a tuft of long hairs, which in common with the hairs on the thorax, converge into a ridge on each of the interlinear spaces. Scutellum small, but long in proportion to its breadth, slightly shagreened. Fovæ very shallow, confluent, smooth and shining. Legs dark shining, semi-translucent brown, with abundance of whitish hairs.

Wings large, surface covered with short, stout, nearly erect hairs, and *numerous dark opaque with lighter cloudy spots.* Veins dark shining brown and very heavy. Cubitus, as in *C. nubila*, is very broad and heavy at its union with the 1st transverse; 2nd transverse broad and heavy, particularly at the base of the radial area. Areolet not large, but clearly defined. The radial vein at its termination forms *a large triangular blotch with an indistinct areolet in the centre.* By the curvature of the radial vein and its considerable backward extension along the margin of the wing and the upward extension of the costal vein beyond the base of the radial area,

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what may be termed a *half open* and perfectly radial area is formed. The anal vein is sometimes branched or forked at the tip.

Length—body .14, wing .16, antennæ .08. Des. from living specimens. Galls received from Prof. E. T. Cox, of Tucson, Arizona.

DIASTROPHUS SIMILIS, n. sp.

Galls on *Nepeta glechoma.* simple or compound; the simple ones are round and have a single cluster of larval cells in the centre; the compound are extremely irregular in form and size, and have two or more distinct clusters of cells. The round galls vary in size from 1/8 to 3/4 of an inch in diameter, and contain from one to six and even more round larval cells. The cells in dry galls are held in place by coarse fibres that are attached to the cell and to the extremely thin and almost paper-like outside covering of the gall. From galls that lie on the ground through the winter the outside quite often entirely disappears, and the bleached fibres surrounding the larval cells look like little burrs. The galls grow on the leaves, petioles and occasionally on the stems of the plant. The plant is not common in this place, but wherever I have seen it the galls are also found. Very fine specimens have been sent to me from Long Island. This species does not seem to differ very much from *D. glechomæ* found in Europe, and may be identical. The plant is supposed to have been introduced from Europe, and with it the insect may have come, but such descriptions as I have found of *D. glechomæ* are not sufficiently full to enable me to decide as to their identity, and I have some very good reasons to believe them distinct.

Gall-fly: Head black, finely rugose on the vertex. Ocelli small, close together, and almost linear in position. Face rough, broadly carinate. Mandibles black. Antennæ long, slender, thirteen-jointed with faint traces of a suture in the last joint; 2nd one-half as long as the 1st; 3rd to the 12th inclusive of equal length; 13th one-third longer than the preceding. The head hairy on the posterior side. Thorax black and shining, but when highly magnified it presents a beautifully crackled surface. The two parapsidal grooves broad and smooth, narrowly convergent on the scutellum. Scutellum unevenly and roughly rugose. Fovæ large and deep, separated by a low smooth ridge. Legs of a uniform reddish brown, ungues black. There is on the middle of the posterior side of the posterior pair a rather dense tuft of hairs much longer than on the other legs and reminding one of the tufts found similarly situated on certain species of bees.

Wings hyaline; veins slender, pale yellowish brown. Areolet wanting,

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and the thick dark spot at the confluence of the veins, which usually marks the obsolete areolet, also wanting. Cubitus very pale, and reaching only half way to the first transverse. Radial area open. Abdomen black, shining; 1st, 2nd and 3rd segments dorsally sub-equal, 1st with a minute round, dense tuft of hair on the sides beneath the wings. Sheath of the ovipositor not exserted, inconspicuous, a few minute hairs at the point.

Length - body .12, wing .15, antennæ .10.

Described from living insects cut from the galls, Oct. 23, 1879. The flies probably live in the galls over winter.

C. MINUTA, n. sp.

As soon as the leaves of *Quercus alba* begin to expand in the spring, a few buds are occasionally seen that develop into a cluster of greatly enlarged petioles without a leaf blade, or at most only a very rudimentary one. They are three or four times the size of those of a full grown leaf, and each contains a number of larvæ of the small gall insect which I have named *C. minuta.* The larvæ mature very rapidly and the imagos leave the gall about the time that the leaves are full grown. Occasionally an embryo leaf seems to have escaped the sting of the mother insect, and a fully developed leaf appears among the galls, but such instances are not common. The galls are pubescent and usually of a pinkish color. The insects are of both sexes, and may be described as follows:

Male: The entire body a clear semi-transparent amber, with a shade of brown on the thorax and the back of the abdomen. The eyes and ocelli a dull black, the latter much less prominent than in *C. vesicula*, n. sp. (next described). Antennæ 14-jointed, the first three joints pale amber, the remaining ones by a sudden transition a dusky brown; 1st joint club-shaped, 2nd oval, 3rd long and slender, curved, but only slightly incised; remaining ones short and of nearly equal length.

Thorax smooth and shining, but in certain lights the living specimens show bands of darker brown where the parapsidal grooves appear in other species. Scutellum small, smooth and shining. Fovæ wanting, but the furrow separating the mesothorax and scutellum broad and deep.

Wings with a slight smoky tinge, veins distinct. Cubitus reaching quite to the 1st transverse. Areolet of medium size. Radial area long and narrow, partially closed by the thickened border of the wing as in *C. vesicula.* Legs of a uniform pale amber, ungues dusky brown.

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Abdomen petiolate, small, smooth, shining and tapering to a cone-like point at each extremity.

Length—body .08, wing .10, antennæ .07.

Female: Entire body except the antennæ and legs apparently black, but really a very dark brown. Antennæ 13-jointed, and as in the male, except that they are shorter and the 3rd joint is straight. First segment of the abdomen (petiole?) short, remaining ones taken together not longer than deep.

The color, the much smaller wings (only .08), the shorter antennæ and the very short petiole give to the female an appearance so distinct from that of the male that it is not easy to believe that they belong to the same species; but that they are the same is proved by their being often found *in coitu*, and indirectly by the fact that there are several other species in which the sexes differ in the same way, and to almost as great an extent as in this case.

Length—body .07, wing .08, antennæ .05. Not rare in this section.

CYNIPS VESICULA, n. sp.

Gall a small, smooth, reddish brown vesicle developed from the centre of the buds of *Quercus alba*, surrounded at the base by the bud-scales. The color is sometimes a pale greenish brown. The walls of the gall are thin and the larva free, that is, having no larval cell. These galls are partially developed in the preceding autumn, and mature so rapidly in the spring that the insects emerge about the time the leaves of the oak begin to expand.

Gall fly—Male: Head small, black, vertex triangular, and nearly covered by the large and protruding ocelli which form an equilateral triangle. Eyes very large. Face narrow, almost linear, the breadth considerably less than half the width of one eye as seen from the front. Antennæ long, filiform, 15-jointed, 1st and 2nd joints short, globular, 3rd deeply incised, the remaining ones nearly equal in length, except the very short terminal joint; 1st joint nearly black at the base, the others yellowish brown, darker towards the tip of the antennæ. Thorax shining black with extremely fine microscopic reticulations; no grooves or lines. Scutellum; surface as the mesothorax. Fovæ shallow and indistinct. Wings very large, clear smoky brown. Veins dark and heavy, the 2nd transverse when the wings are closed on a line with the extremity of the abdomen. Cubitus heavy and reaching quite to the 1st transverse. Areolet distinct. Radial area long

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and narrow, and apparently closed by the somewhat thickened border of the wing. This thickened border of the wing scarcely deserves to be called a vein. Legs: Coxæ and trochanters clear shining black, changing below to yellowish brown, which is the color of the remaining parts. Color of the posterior pair a little darker than the others, particularly near the body. Abdomen shining black, the first segment an extremely slender pedicel, which is slightly enlarged in the middle.

Length, body .12, wing .16, antennae .12.

Female: Head broader than in the male. Ocelli and eyes much less prominent, face twice as broad. Antennae slender, pale brown at the base changing to dusky brown above. Some shades darker throughout than the male antennæ and only two-thirds as long; 14 joints. Thorax like the male except that there are two faint parapsidal depressions, hardly grooves. Wings smaller and shorter. Color and venation the same. Legs paler. Abdomen large, shining, black, not distinctly pedicilate. This appears early in April.

Length, body .13, wing .14, antennæ .08.

CYNIPS PATTONI, n. sp.

Galls, clusters of larval cells along the midvein of the leaves of *Quercus obtusiloba*, on the under side, and standing perpendicular to its surface. The cells are completely hidden in a short, dense brownish wool. The largest clusters often extend along the midvein more than half the length of the leaf. They are found on young trees, and usually on the leaves near the top of the stronger growing shoots. The insects live over winter in the galls. My specimens gathered in October were kept in a warm room and the insects came out in the February following. The galls resemble in their woolly covering those of *C. flocci* of Walsh, but the latter are round and the woolly hairs are longer, and the species is only found on *Quercus alba*. *C. Pattoni* was discovered in 1876 on West Rock, in New Haven, Conn., by Mr. W. H. Patton, from whom I have received several interesting species of gall insects, and to whom, in acknowledgment of my indebtedness, I dedicate this species.

Gall fly: Head reddish brown. Antennae 14-jointed, dusky brown. The last two joints indistinctly separated by a closely connected suture. Entire head and face covered with short white hairs. The tips of the mandibles black. Thorax very dark shining brown, that in certain positions appears quite black; surface finely and evenly reticulate. Par-

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apsidal grooves closely convergent at the scutellum. Short line usually present over the base of each wing, in this species wanting. A few scattered hairs on the borders of the mesothorax, most abundant at the base of the wings. Scutellum rugose, hairy. Fovae large and shallow. Legs a uniform reddish brown except the darker tips of the tarsi. Wings hyaline, veins fine and slender, dark brown. Areolet medium size, cubitus very pale and sometimes quite disappearing before reaching the 1st transverse; radial area open, broad and rather abruptly terminated by the short curve of the radial vein. Abdomen shining blackish brown, lighter on the venter. A few hairs on the sides of the first segment beneath the wings. The ventral valve projects a little above the dorsum.

Length, body .08, wing .11, antennae .07.

Described from twenty-five specimens, all females. In my collection.

CYNIPS POLITA, n. sp.

Galls round, monothalamous, found abundantly in midsummer on both surfaces of the leaves of *Quercus obtusiloba*, at or near the summit of young and thrifty shoots, from one to fifteen or twenty on a single leaf. They are from one-fourth to three-fourths of an inch in diameter, and are when grown in the shade of a paler green than the leaf, but when exposed to the sun are red or brown. They are attached so slightly to the midvein and its branches that their removal leaves little if any trace. The shell is when dry extremely thin and brittle, and the single round larval cell is kept in a central position by fine radiating and branching fibres that extend to the outside shell.

These galls resemble, except in their mode of attachment to the leaf, those of *C. singularis* B., but the insects differ considerably. They are also somewhat like those of *C. inanis* Harris, but are many times smaller. The insects are fully mature in October, but remain in the galls over winter.

I received my specimens of this species from Mr. E. Potts, of Philadelphia, and from Mr. Thomas Annadown, of Glassboro, N. J., and Mr. P. H. Uhler informs me that they are very abundant in southern New Jersey and in some parts of Maryland.

The shining and finely polished thorax and abdomen suggest the specific name given to the insect.

Gall flies: All females. Head apparently black, but in a strong light it is seen to be a very dark reddish brown; cheeks a shade lighter than

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the other parts. Vertex beautifully reticulate. Antennae black, 14-jointed, 1st joint club-shaped, 2nd short ovate, 3rd as long as the two first taken together, 4th one-fourth shorter than the 3rd, remaining joints except the last short, sub-equal, last a little longer than the 13th. Thorax black, smooth and shining. . Parapsidal grooves two, deep and narrow; between them are two parallel depressions that reach from the collare two-thirds the distance to the scutellum, but so very slight are they that they can only be seen by means of the difference in the angles of reflection when they are placed in a strong light. There are a few scattered hairs on the thorax and the polished and mirror-like pleurae are bordered with short scattered white hairs. Scutellum finely wrinkled, rounded posteriorly and projecting over the metathorax. Fovae small, widely separated, shining. Legs a very dark reddish brown, a little lighter at the joints. Wings hyaline, veins moderately heavy. Cubitus pale and slender. Areolet small. Radial area open, short and broad by the curvature of the radial vein. Abdomen black and polished. Pedicel, which in most species is a short thin plate, is in this more than half as long as broad. First segment with a very few scattered hairs on the sides beneath the wings. Sheath of the ovipositor slightly projecting, and at the end it has a few long yellowish hairs.

Length, body .11, wing .14, antennæ .08.

Described from dry specimens in my collection.

CYNIPS RUGOSA, n. sp.

Round, hard galls, sessile, on the branches of *Quercus prinoides*. Size from ½ to ¾ of an inch in diameter. They are attached to the branch by a small point. The surface when green is smooth and often quite red on the side exposed to the sun. When fully ripe they have a shrunken and shrivelled surface and the color varies from an ashen hue to a dull brown. The free larval cell is surrounded by a yellowish brown cellular mass, too dense to be called spongy, which fills the entire gall. This species has been known to me for many years, but until lately I have considered it a variety of *C. globulus* Harris, but a careful study convinces me that it is a distinct species. *C. globulus* is only on the white oak and rarely more than one or two galls in a place, and has even when dry a smooth surface, while *C. rugosa* is often found in clusters of four or five and even more, so closely compressed that the galls are of an angular or cuneate form. The flies are all females and they mature and leave the

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galls late in the fall, at least I have never been able to find them in the galls in winter.

Gall-fly: Head small, vertex wrinkled. Ocelli minute and very close together. Face with short hairs which are longest about the mouth. Antennæ dark brown, 14-jointed, 1st joint large, club-shaped; 2nd broader than long, 3rd longer than the first two taken together, 4th as long as the first two, the four next following gradually shorter, 9th and remaining ones short and of equal length. Thorax covered with short appressed yellowish white hairs, which nearly hide the punctate surface. Parapsidal grooves: two parallel lines that extend rather more than half way from the collare to the scutellum, and two, also parallel, that extend half way from the scutellum to the collare, and a short line over the base of each wing, all nearly parallel and equidistant. Legs dark reddish brown. Wings large, hyaline; veins blackish brown, quite distinct, the subcostal and 2nd transverse darkest. Areolet present, not large. Cubitus reaches only half way from the areolet to the 1st transverse. Veins enclosing the open radial area stop abruptly before reaching the margin of the wing. Abdomen black, shining; 1st segment (in dry specimens) equals in length all the rest, and is covered with short white hairs on the sides beneath the wings. Sheath of the ovipositor a dark yellowish brown.

Length, body .16, wing .18, antennæ .10.

Described from numerous specimens in my collection.

CYNIPS CICATRICULA, n. sp.

Polythalamous galls on the midvein of the leaves of *Quercus alba*, never more than one on a leaf, and situated sometimes at the base, but usually from one-fourth to one-half way from the base, rarely above the middle. They project one-third below and two-thirds above the surface of the leaf. On the under side of the leaf they are rounded and on the upper cone-shaped. The gall is solid and somewhat fibrous, and in its shorter diameter measures about one-half inch and in the longer from five to seven-eights of an inch. The larval cells radiate in all directions from the centre of the gall and are quite numerous. There is at or near the summit of the cone a small scar or indentation which is always present and so characteristic as to suggest the name I have given to the species.

CYNIPS CAPSULA, n. sp.

Galls: Monothalamous, on slender pedicels on the margins of the

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leaves of *Quercus bicolor*, rarely more than one on a leaf. The pedicels are from one-half to three-fourths of an inch long. The galls are three-eighths long and one-eighth of an inch in diameter, oval and resemble very closely the capsules of certain mosses. Surface rough, and with the pedicel finely pilose, or rather, pubescent. The pedicel is usually, but not invariably, the extension of a lateral leaf vein. The whole is of the color of the under side of the leaves of this species of oak. Most of the leaves which bear galls are fully developed, but a part are more or less imperfect and occasionally a gall is found on what is but the merest rudiment of a leaf.

The galls appear with the leaves and the insects come out early in June. This little gall is a true larval cell and its thin walls offer slight obstacle to the attacks of parasites.

The gall flies are of both sexes and are described as follows:

Female: Color a deep shining black, with the exception of the antennæ, legs and sheath of the ovipositor. Head and thorax microscopically punctate and sparsely dotted with extremely fine, short hairs. Parapsidal grooves: One pair converging as they approach the scutellum, and a slight groove over the base of the wings. The short parallel pair seen in many species near the dorsal line is in this species represented by a very slight depression on each side of the rather prominent dorsal ridge, but these last are so obscure as to easily escape notice. The scutellum wrinkled rather than punctate. Foveæ wanting. Antennæ short, 13-jointed, 1st and 2nd globose, 13th as long as the 11th and 12th together and with a connate suture. Color amber, inclining to brown. Legs: Coxæ, trochanter black or blackish brown, femur and tibia dark, clear shining brown, paler at the joints. Tarsi pale cinnamon brown. Ungues black. Wings hyaline, veins pale brown, fading in the smaller ones to hyaline. Areolet small, indistinct. Radial area short, broad, open.

Abdomen: 1st segment equal in length to all the others taken together. The sheath of the ovipositor dark translucent brown, not turned up at the extremity.

Length, body .10, wing .11, antennæ .06.

Male: The smaller size, darker and longer antennæ, darker legs, and the much smaller and laterally compressed abdomen distinguish the male from the female.

Length, body .07, wing .11, antennæ .08.

Described from dry specimens in my collection.

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CYNIPS AFFINIS, n. sp.

Monothalamous, round, thin-walled galls in the buds of *Quercus prinoides*, usually partly hidden in the scales of the bud, but in some instances standing out round and free like a little blister on the twig, in size only large enough to hold the larva within, and in color dark brown with grayish spots, or wholly brown. These galls are half-grown in the autumn and develop so rapidly in the spring that the insects come out just as the leaves begin to expand.

I should have been disposed to consider this species a variety of *C. vesicula*, which, both in gall and in insect, it closely resembles, had not late discoveries shown that dimorphic species often in one generation closely resemble each other and in the next develop characters that fully establish their non-identity.

The gall insects are of both sexes and may be described as follows:

Female: Black. Head finely rugose. Ocelli prominent. Antennæ 14 joints on a protuberant base; 1st joint short, truncated; 2nd short, ovoid; 3rd one-fourth longer than 1st and 2nd taken together, 4th equal to the first two, 5th to 10th gradually shorter, the remaining four subequal, the last small and pointed. Color clear yellowish brown in the basal half, changing to dusky brown toward the tip.

Mesothorax very finely and evenly punctate; parapsidal grooves wanting. Scutellum small, punctate, separated from the mesothorax by a rather broad shining groove. Legs clear, shining, almost translucent brown, with a darker shade in the trochanter and upper half of the femur.

Wings smoky. Veins smoky brown. Subcostal and the two transverse much darker than the others. The areolet of medium size, and instead of the usual equilateral, in this species it is an isosceles triangle with the narrow base on the 2nd transverse vein. Cubitus slender but reaching quite to the 1st transverse. Radial area open, but the subcostal extends above the base a short distance, and the anterior border of the wing is somewhat thickened, which gives, in certain lights, the appearance of a closed radial area. Abdomen briefly petiolate, black and shining, so shrunken in the specimens before me as to render further description impossible.

Length, body .09, wings .11, antennæ .08.

Male: Antennæ 15-jointed, slender, long, 3rd joint deeply incised. Color of antennæ as that of female. Wings much larger. Legs paler

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and the dark brown of femur wholly wanting. Abdomen with a long slender petiole, very small and black and shining throughout.

Length, body .11, wing .13, antennæ .11.

C. GEMULA, n. sp.

This species is a recent discovery of mine, having escaped detection on account of its early appearance and minute size. The gall is found in the centre of both the flowering and leaf buds of *Q. prinoides*. It is fully developed when the sterile flowers of this species of oak are in bloom. Only one gall is found in a single bud. It is exactly like an ordinary acorn in shape, having a truncate base and a cone-like extremity with a sharp point at the apex. It is a dull blackish color, and only .10 of an inch in length and .05 in diameter. It contains but one larva. When the gall happens to be in a leaf bud it is often found at the summit of a young branch one or two inches long, so rapid is the growth of the tree at this season. In the flower buds it is often nearly hidden in the surrounding bud scales. The insects appear in both sexes about the middle of May, and may be described as follows:

Female: Head black, finely rugose. Ocelli medium size, the anterior one forming the vertex of a more than ordinarily obtuse triangle. Antennæ 14 joints; 1st short, truncate; 2nd ovate and standing in the cup-shaped summit of the first like an egg in an egg cup; 3rd short, though a little longer than the first two taken together; 4th a very little shorter than the 3rd. Remaining ones sub-equal and of moderate length. In color the 1st and 2nd are a clear brownish yellow, the rest a dull brown, growing darker in the terminal joints. Thorax bright shining black. Parapsidal grooves well defined; no other lines or grooves. Scutellum finely rugose. Fovæ wanting, but there is a smooth narrow groove between the meso-thorax and the scutellum. Legs a clear, uniform amber, ungues black. Wings decidedly fuscous. Veins dark and well defined. Cubitus *heaviest in the lower half*. Areolet present, but very minute. Radial area open. Radial vein heavy its entire length and slightly thickened at the end, which does not quite reach the margin of the wing. Abdomen sub-pedicellate; 1st segment very long, shining black, remaining segments in dry specimens concealed in the first so completely as to make their study very difficult. Sheath of the ovipositor very small, with a few microscopic hairs on the dull yellowish brown tip.

Length—body .08, wing .11, antennæ .07.

Male: Antennæ 15 joints, the 1st and 2nd a little darker than in the

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female, the 3rd slightly curved. Thorax narrow. Wings much larger than the females. Abdomen very small and much compressed laterally; in other respects not differing materially from the female.

Length—body .09, wing .14, antennæ .09.

This species is often found with *C. affinis*, but both gall and insect are quite different from that species.

C. PIGRA, n. sp.

The galls of this species answer perfectly to Baron Osten-Sacken's description of *C. q. tumifica.* They are large irregular swellings on the midrib of the leaves of *Q. tinctoria*, always on the under side and usually on the lower half of the leaf. Sometimes two distinct galls are found on the same leaf. Their presence is only indicated on the upper surface by a widening of the midrib and a slight depression of the leaf at that point. They are often an inch in length and in the middle half an inch in diameter, tapering more or less towards the ends. They are of a dense cellular tissue, with the woody fibre of the midrib along the axis. The cellular portion contains a large number of larval cells, which are inseparable from the enveloping substance.

Having discovered a young oak nearly all of whose leaves had these galls upon them early in June last year, I made frequent visits to it to watch the development of the larvæ. Quite sure that they would prove to be *Cynips q. tumifica*, I expected to find the insects fully matured early in July, but at that time the larvæ could scarcely be seen in the soft, immature vegetable cells that surrounded them, and it was late in autumn when the perfect insects made their appearance. This extremely slow development suggested the specific name. The gall flies are all females, and differ widely from *C. q. tumifica* O S.

Description: Head, thorax and abdomen deep black. Ocelli small, widely separated and inconspicuous in the rather coarsely rugose surface of the vertex. Antennæ 14-jointed; 1st joint short, club-shaped, 2nd ovate, 3rd not quite as long as the 1st and 2nd taken together; 4th, 5th and 6th each a little shorter than the one immediately preceding it. The remaining joints sub-equal and scarcely shorter than the 6th. Color at the base is a clear yellowish brown changing gradually to a light dusky brown at the end. Thorax finely and evenly punctate. A favorable light reveals two extremely faint, parallel lines that extend half way from the collare to the scutellum. They might more properly be called depressions, as they

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do not interfere with the punctation. There is a very short but broad and smooth groove that begins at the scutellum on the middle of the mesothorax; it ends suddenly as a groove, but continues as a faint depression half way to the collare. The parapsidal grooves are fine and narrow, but distinct. There is a smooth polished line over the base of the wings. Scutellum rugose, round, small. Fovæ large and deep. Legs rather dark reddish brown. Wings large, hyaline, veins slender but sharply defined; areolet small, radial area open, cubitus extremely slender in the lower half and colorless throughout. Abdomen polished and shining, 1st segment long and more than equalling in length the remaining ones taken together. A few short scattered hairs on the anterior half beneath the wings. Sheath of the ovipositor very short, color at the tip dark yellowish brown, a few very short microscopic hairs at that point.

Length—body .11, wing .14, antennæ .08.

C. IGNOTA, n. sp.

Galls: Small oval cells, found singly or in small clusters of from two to eight together on the under side of the leaves of *Q. bicolor*. They are sessile on the midrib and principal veins, and usually lie in a position nearly horizontal to the surface of the leaf. They are at first covered with short woolly hairs, but when ripe become more or less denuded. The naked surface when examined with a microscope shows numerous minute papillæ, and between these a fine and regular reticulation. They are .10 of an inch in length and .05 in diameter, and might easily be mistaken for the cocoons of some species of *Microgaster*.

About fifteen years ago I found a few of these galls on the fallen leaves of a large oak and also on a small tree a few rods distant. The next year the greater part of the leaves on the large tree were covered with galls, a hundred or more being sometimes found on a single leaf. I gathered a large quantity after the leaves fell, and the flies came out the next spring. I have examined this tree every year since and have never found any of these galls, nor have I ever seen them on other trees.

There are some specimens of this species in the Museum at Cambridge, which Dr. Hagen informs me were found on oaks in the University grounds. I examined some oaks of the same species in the borders of the Botanical Garden at Cambridge last fall, and found several species of galls, but none of these. Can it be that the species has disappeared entirely?

The flies are all females.

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Description: Head black, finely rugose. Ocelli small. Antennæ 13-jointed; 1st and 2nd joints short, dusky yellowish brown, remaining ones changing gradually from dull dusky brown to dark opaque brown. Thorax microscopically crackled or striate, the striæ apparently transverse, though not so over the whole surface. Parapsidal grooves present, but not as strongly impressed as in most species; no other lines. Scutellum finely rugose. Fovæ wanting. Legs clear yellowish brown, posterior pair much darker, especially the femur. Wings slightly dusky, veins pale slender. Areolet medium size, and bounded by almost transparent veins. Radial area open; cubital vein very slender. Abdomen black; 1st segment black and shining, in length equal to all the others taken together. Sheath of the ovipositor short, dusky yellowish brown at the tip.

Length—body .07, wing .10, antennæ .06.

C. PAPULA, n. sp.

Clusters of small papillose or cone-like galls on the upper side of the leaves of *Q. rubra* and *Q. tinctoria*, projecting unequally and usually so crowded as to form a confluent mass of pustule-like elevations. They are very hard, though only transformed portions of the blade of the leaf. On the under side of the leaf they appear simply as a scar, projecting little if at all. They bear a slight resemblance to the galls of *C. futilis*, but this species is rarely confluent and never beyond two or three galls, while *C. papula* is quite often found in clusters of forty or fifty, or even a hundred. *C. papula* is monothalamous, while *C. futilis* has, usually, from three to five larvæ in each gall.

I discovered this species many years ago on a red oak tree near my residence, but the galls were only seen on a single leaf. Soon after I found a leaf or two having these galls upon them—on the same species of oak, twenty miles south of this place (at Derby, Conn.); and still later found them in considerable numbers on the leaves of *Q. tinctoria*, at Chicopee, Mass. In this last locality I have observed them for several years, but always confined to a few trees in a very limited area.

This species *ought* to be found in both sexes, but among the few specimens in my collection I cannot discover any males.

Description: Head dark reddish brown. A few white hairs on the posterior edge of the vertex. Ocelli large. Vertex finely punctate. Antennæ brownish red, darker towards the extremity; 13-jointed, the last three joints connately joined, and forming a rather heavy club, such as is

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seen in many Braconides. Thorax black, lustreless, sparsely covered with very fine short hairs. Parapsidal grooves faint and indistinct, converging slightly as they approach the scutellum. A very faint median line, discernible on the posterior part of the mesothorax, extends one-third the distance to the collare. Surface of the entire thorax.

Fovæ present but indistinct. Legs reddish brown. Abdomen shining black. Sheath of the ovipositor yellowish. Ovipositor yellowish brown, and remarkable for its great length. In all my dry specimens it is exserted to a length at least five times that of the entire body, and is coiled two or three times.

Wings hyaline. Costal and first and second transverse veins fine clear reddish brown, the others fine and nearly colorless. Cubitus extremely faint, and quite disappearing before reaching the first transverse. Areolet small and elongated, and in some specimens wanting. Radial area open.

Length—body .08, wing .07, antennæ .04.

C. NOXIOSA, n. sp.

Galls : Large, woody, polythalamous, terminal or sub-terminal swellings on the twigs of *Q. bicolor*, varying greatly in size and form, but usually tuber-like and three or four times as long as thick. The larger specimens in my collection are nearly an inch in diameter and four inches long, and contain a large number of insects. The smallest are almost imperceptible swellings, and have often but a single insect. These galls develope in the summer, and the insects, which are all females, live in the galls over winter, coming out before the leaves appear in the spring. They resemble, both gall and gall-fly, *C. batata B.*, and I for a long time, considered them a variety of that species. Some new facts in the history of *C. batata B.* having been learned, I shall re-describe it in these articles, when the differences between the two species will be stated. *C. noxiosa* is described as follows :

Head black, finely and regularly punctate. Antennæ 13-jointed ; 1st dark, nearly black ; 2nd and 3rd brownish yellow, the remaining ones gradually changing to dark dusky brown. Thorax smooth, but under a one-eighth lens showing a beautifully fine crackled surface. Parapsides entirely wanting. Surface of the scutellum like the meso-thorax, though the markings are a trifle coarser. Fovæ wanting. Legs dark shining brown, with clear yellowish brown joints. Tarsi dark yellowish brown.

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Wings hyaline. Veins almost black, all clear and distinct. Areolet small but very sharply defined. Cubitus unusually heavy its entire length. Radial area open, the veins enclosing it strong and dark quite to the edge of the wings. Abdomen smooth, shining black, much shrunken and distorted in the dry specimens, and the long ovipositor much exserted.

Length—body .08, wing .09, antennæ .06.

These galls are invariably preceded by a vernal crop, which affects the leaves only, and which may be described as follows: Gall, an enormous development of the mid-vein of the leaf, often to the extent of an inch in diameter and an inch and a half in length. Green, smooth, but irregular in shape, and succulent and a little harder than a green grape. The blade of the leaf, dwarfed and curled, and after the galls mature drying up. In some years these galls are so abundant on certain trees as to affect nearly all the vernal leaves, but a later crop hides the blighted appearance they produce. They are filled with larval cells, from which are produced vast numbers of male and female gall flies, about the twentieth of June. Long observation has satisfied me that this is the bisexual generation of *C. noxiosa.* The females of this brood agree exactly with the above species, except in size and in the length of the antennæ, they being a little smaller.

Length—body .07, wing .08, antennæ .04.

The males, which are nearly or quite as abundant as the females, differ from them as follows: Color throughout somewhat paler. Body longer. Antennæ 14-jointed, 3rd joint curved but not incised. Legs clear yellowish brown. Abdomen small, petiolate, petiole slender.

Length—body .09, wing .08, antennæ .05.

Large numbers of both generations in my collection.

CYNIPS CORRUGIS, n. sp.

This species is founded on a single specimen which I took from the claws of a small spider that had evidently just killed it. The spider was in a cluster of the sterile flowers of *Quercus prinoides.* The capture was made on the 11th of May. This species is remarkable for the almost diaphanous wing veins, the pedicellate abdomen, and the coarsely corrugated sculpturing of the thorax. It is a female, and may have been in the act of ovipositing in the young acorns or the buds of this oak when killed by the spider. The description is as follows:

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Head clear dark reddish brown, finely and evenly rugose. Ocelli dark brown, not *black*, as is usually the case among the Cynipidæ. Antennæ 14-jointed, clear translucent brown, except the four or five terminal joints, which are darker and more opaque. Mandibles black and shining, and contrasting beautifully with the clear light brown of the face. Thorax clear, translucent brown, somewhat darker than the head, coarsely rugose and corrugated; even the parapsidal grooves have a wrinkled surface, and are in certain lights scarcely distinguishable from the general surface. Scutellum like the meso-thorax, but small and ending abruptly posteriorly and perpendicularly to the axis of the body. Fovæ wanting. Wings and wing veins, except the subcostal and 2nd transverse, perfectly hyaline; these last have a very faint brownish tinge. Areolet wanting. Radial area open. Legs clear dark, somewhat paler at the joints. Tarsi pale brown; ungues nearly black. Abdomen petiolate; 1st segment clear brown at the base, changing to shining black posteriorly; in length equal to one-half the entire abdomen; remaining segments of an opaque brownish black, and with a fine microscopic punctation. Venter and the sheath of the ovipositor clear shining brown, the sheath without hairs and only moderately exserted.

Length—body .11, wing .12, antennæ .06.

C. CINEROSA, n. sp.

Globular, monothalamous galls, from three-fourths to one inch in diameter, the surface in recent specimens covered with a mealy grayish powder, which disappears when the galls have been long exposed to the weather; internally of a dense cellular structure, much like the galls of *C. q. globulus*; the rather large, centrally placed larval cell nearly or quite free. These galls, and the gall flies produced from them, were collected in Texas, and were sent to me by Mr. Wm. Saunders, of London, Ontario, who received them from Prof. J. M. Maisch, of Philadelphia. I have been unable to learn from what species of oak they came.

The flies, which are all females (20 specimens), may be described as follows: Head small, covered throughout with short appressed hairs. Tips of the mandibles shining black. Color of the head, thorax and legs, a dull yellowish brown. Antennæ 14-jointed; short, hairy, dusky brown, except that the first joint on the inner side, and the second and third at the tips, are a paler brown and shining.

Thorax: two parallel lines extend from the collare half way to the

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scutellum. The space between these is darker than outside. There is a short median line starting on the posterior edge and soon disappearing, and two rapidly diverging lines from the same border, which extend half way to the collare. Outside of these are two parallel lines of the same length. All these are some shades darker than the general surface.

Scutellum small, and hairy like the meso-thorax. Fovæ wanting. Abdomen clear shining reddish brown, except the posterior edges of the segments, which are nearly black; 1st segment, except a small spot on the dorsum, covered with fine short hairs; sheath of the ovipositor very large and with strong white hairs; ovipositor shining black, and slightly exserted in dry specimens. *Ungues* black. Wings sub-hyaline, veins dark brown; second transverse heavy. Areolet distinct but small. Cubitus slender, and disappearing before reaching the 1st transverse. Radial vein heavy, and ending in an enlarged point within the border of the wing; radial area open. Length of a specimen of average size, .18.

This species is probably the agamous generation of what will yet be found in another generatien and in another form of gall, two-gendered. The galls and insects sent me vary so much in size that I strongly suspect they may represent two very closely related species, but the slight differences between the large and small flies hardly warrant me in separating them till I can learn more of their habits. My description refers to the *largest* specimens.

C. FLOCCOSA, n. sp.

The late, terminal leaves of the thrifty shoots of young oaks of the species *Q. bicolor* are often thickly dotted on the under side with small hairy, or rather woolly, galls, sometimes as many as two hundred being found on a single leaf. The leaves are sometimes quite small, and in such instances the galls become nearly or quite confluent. They measure, including their woolly covering, about .15 of an inch across, but divested of this, only .05 or .06, and each contains but a single larva. The larva is free, having no larval cell. The galls are hemispherical, and attached by their flat side to the leaf, and they show on the upper surface only as small, smooth, flat, shining blisters. They are so much infested by inquilines and other parasites that all attempts to rear true gall flies from them proved fruitless for many years. I, at length, succeeded in rearing in the spring a considerable number of true gall flies from galls collected the October preceding in Northern Ohio. Only females have

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yet been reared, and these minute creatures will be found, no doubt, like other and larger ones that live over winter in the galls, to be only of one sex. The description is as follows:

Head, thorax and abdomen shining black and smooth. Ocelli large, but not conspicuous. Antennæ 13-jointed; 1st and 2nd joints comparatively stout, the 3rd a little longer than the two preceding ones taken together, very slender; the remaining ones also slender, but slightly increasing in thickness towards the last; color, a pale, dusky yellowish brown. Thorax without lines or grooves of any kind, anteriorly high and rounded. Scutellum very small. Fovæ obsolete. Legs dark brown, except the joints and the tarsi, which are almost colorless. The wings rather large. Areolet large. Radial area long, narrow and open. The cubitus is very slender, and disappears at some distance from the 1st transverse. The vein bounding the areolet on the posterior side is so nearly colorless at that point that the areolet itself might easily be pronounced wanting.

Abdomen smooth and shining; the terminal segments, in dry specimens, are almost entirely retracted into the rather large 1st segment; the abdomen is sub-petiolate.

Length—body between .04 and .05, wing .06, antennæ .03.

C. Coxii, n. sp.

Galls: Hard, smooth, woody knots or swellings on the twigs of *Quercus, sp.* They are covered with bark not unlike the rest of the twig. The two specimens in my collection are not more than three-fourths of an inch in diameter, but whether of average size or not I am unable to say They might easily be taken for small specimens of *C. Suttonii, B*, from California, or for *C. batatoides*, Ashmead, an unpublished species from the live oaks of Florida, but the insects differ specifically from both these.

My specimens were received from Prof. E. T. Cox, who collected them near Tucson, Arizona, probably from one of the dwarf live oaks of that region. I have reared from them only female gall flies, which are described as follows:

Head deep yellowish brown; vertex very slightly punctate. Ocelli small, black. Antennæ near together, 14-jointed; 1st joint short club-shaped, 2nd short ovate; these two, in a favorable light, are an almost golden yellow; 3rd one-third longer, and the 4th a little shorter than the 1st and 2nd taken together; the 5th, 6th and 7th short, and the remain-

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ing ones very short, and all of them of a dull opaque brown; at the base of the antennæ, on the lower side, is a nearly black spot, its edges fading into the prevailing color. The face is hairy; the mentum smooth, but with a fringe of long stiff hairs on the lower edge. The mandibles are dark, nearly black. The color of the thorax differs considerably in different individuals; in some it is quite black, but in most is more or less clouded with spots of clear shining yellowish brown. The pleurae are black in all my specimens. The parapsidal grooves are large and deep. They start quite near together on the scutellum, and diverge gradually till within a short distance of the collare, when they diverge so suddenly as to form a rather short curve in that part of their course. Scutellum small, finely rugose and hairy, separated from the mesothorax by a broad, smooth band, that can hardly be called a furrow or fovae. Legs clear yellowish brown. Ungues very dark, but not black. Wings hyaline, quite large. Veins rather slender, pale reddish brown. Areolet small. Radial area open, and, by the curvature of the radial vein, broadest in the middle. Abdomen shining black; 1st segment rather large, and with a few short hairs scattered over its anterior half, mostly confined to the sides beneath the wings, remaining segments short and withdrawn (in dry specimens) within the first; sheath of the ovipositor straight, with moderately long hairs towards the point.

Length—Body .11, antennae .06, wings .14.

Described from dry specimens.

[NOTE.—When my description of the gall of *C. cicatricula* was already in type, I found my specimens of the gall flies were quite unfit for description, and the species will be described in a future paper. In answer to some of my friends, who have expressed some surprise that I still retain for all the oak gall insects the old generic name *Cynips*, I will say that I intend to publish a complete list of our described species, with their true generic names, in the course of the summer. In this I shall follow Dr. Mayr's classification, adding to his list of American galls such new species as I have not already submitted to him. In my illustrated monograph, on which I am at work, I shall give brief descriptions of all the American species known to me.]

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CORRESPONDENCE.

ANTIGASTER VS. EUPELMUS.

DEAR SIR,—

I have read with interest Mr. Howard's remarks on p. 31, *ff.* In the article in the *American Entomologist* which he refers to, I stated distinctly that he gives reasons for considering *Antigaster* and *Eupelmus* synonymous, and, as I consider the reasons good, I have no criticism to make thereon. My remarks were intended to show rather that his reflection on Walsh that there were "no grounds for the founding of the genus *Antigaster*" was hardly justified. I endeavored to show that with the light then at his command Walsh had reasons for erecting the genus. The characters of *Eupelmus* as set forth by Mr. Howard are mostly brought together from works subsequent to Walsh's characterization of *Antigaster*. The close relationship of this last with *Eupelmus* was recognized by me as previously stated by Mr. Howard, and whether, in the light of subsequent writings, the two should be combined generically is a question depending on the limitation or comprehensiveness we deem best to give to generic divisions, on which subject I have no reason for differing from my friend who, from special study of the family, is most competent to decide.

C. V. RILEY, Washington, D. C.

HOW WE CAPTURED A HORNET'S NEST.

DEAR SIR,—

One fine day last October, while enjoying a ramble in the woods near Belleville, with two of my sons, one of them took hold of a knot which projected from a small half-decayed log, intending to turn it over to search for beetles beneath it. The piece, however, came away in his hand and disclosed the entrance of a nest of black hornets. Of course we retreated "at the double" before the disturbed insects recovered from their first surprise, leaving them to settle down at their leisure. A few days after, taking advantage of a cool morning, I sent my two boys to the wood with a small bottle of chloroform and a hard rubber syringe. According to directions, they injected about a drachm of the liquid into the hole, and threw a handkerchief over the entrance. In about five minutes they opened up the nest, when they found the inmates in a perfect state of slumber, and transferred them without trouble to their cyanide bottles. In about an hour they returned, bringing me forty-eight specimens of the insect

J. T. BELL.

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THE COLORADO BEETLE.

DEAR SIR,—

The following extract from an English newspaper, the *Bristol Mercury*, will show how carefully the Colorado Beetle is looked after in England and how great a risk he runs if he sets foot within the United Kingdom. He is far more sternly outlawed than was Robin Hood or Smith O'Brien, and if only a suspicion of his presence is felt, all, from the Privy Council downwards, are up in arms to crush him with all the terror of the law. Let us hope they will succeed in making the country too hot for even the ten-lined Spearman.

"Mr. Borlase put a question as to the discovery of a Colorado Beetle in South Devon.

"Mr. Mundella answered, saying the Colorado Beetle was in his department (a laugh). He then gave the facts of the discovery of a live Colorado Beetle in the possession of a man at Yealmpton, who refused to give it up. Upon instructions from the department he was prosecuted under the Destructive Insects Act of 1877, and fined the mitigated penalty of £5, he pleading ignorance of the law and agreeing to the destruction of the beetle." E. W. C.

DEAR SIR,—

I always look for the coming of the CAN. ENT. with pleasure. Having seen several articles in the ENTOMOLOGIST relative to the abundance or scarcity of insects, as compared with past seasons, I would inform you that in 1879 I did not see a single specimen of *Terias nicippe*, while this year they were abundant, in fact more numerous than *Colias philodice*.

Columbus, O., Dec. 2, 1880. W. N. TALLANT.

DEAR SIR,—

On the 6th Oct., 1880, I took six *cresphontes* larvæ feeding on prickly ash. Some of them fed for several days afterwards, and in due time they all transformed to chrysalids. Now they have all emerged as butterflies; the first appeared on the 22nd of March, the last on the 17th of April, 1881. They measure from 3¾ to 4½ inches in expanse of wing, perfect in form and rich in coloring. J. ALSTON MOFFAT.

Hamilton, April, 1881.

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DEAR SIR,—

In your last issue Dr. LeConte pronounces my record of the capture here of *Alaus gorgops* to be "probably erroneous," because he has not known any instance of that insect having been taken north of Texas and Western Louisiana, and that therefore my specimen *must* be *Alaus oculatus*.

Alaus oculatus is of such common occurrence here that I have long ceased to collect specimens, unless remarkable for beauty or for abnormal size, either large or small, and with over twenty years' acquaintance I ought to be tolerably familiar with its appearance and proportions. The specimen in dispute was found resting on a stump in Bleecker's Woods, about half a mile from our city limits, and was taken by me as an unusually fine and large example of *Alaus oculatus*, and placed as such among my seasonal captures; but on placing it in my cabinet I observed so marked and manifest a difference between it and the other specimens, that I thought it might be a distinct species. Finding from Crotch's List that there were only three species known, and possessing examples of two of them, I obtained a specimen of *A. gorgops* from Mr. E. P. Austin, of Boston, for the sake of comparison, which came to hand ticketed "Dallas, Texas." On placing this side by side with mine, I was unable to distinguish the slightest shade of difference except that mine is rather the larger and fresher specimen. In order to show the identity of these two examples, and their common difference from *A. oculatus*, I append their respective measurements as taken at the time, and carefully repeated and verified, as also the dimensions of my largest specimen of *A. oculatus:*

	Mr. Austin's sp'n.	My own.	*A. oculatus.*
Total length,	41 mm. (about 1⅔ in.)	42 mm.	42½ mm.
Length of thorax,	12 mm. (sharp.)	12 mm. (full.)	12½ "
Breadth of thorax,	11½ mm.	12 mm.	11 "
Breadth of elytra,	11½ mm. (full.)	12½ "	11½ "

The ocular spots on the thorax are much larger and more circular in shape than those of *A. oculatus*, and the white marginal lines are much broader and more distinctly marked, in all which characters Mr. Austin's specimen and mine thoroughly agree. I am thus led to the conclusion that either my specimen is *Alaus gorgops*, or that Mr. Austin's *is not.*

I have in my collection examples of *A. oculatus* varying in length from 42½ mm. to 25 mm.

JAMES T. BELL.

Belleville, April 29th, 1881.

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The Canadian Entomologist.

VOL. XIII. LONDON, ONT., JUNE, 1881. No. 6

ENTOMOLOGY FOR BEGINNERS.

BY THE EDITOR.

THE EYED ELATER—Alaus oculatus.

This is the largest of our Elaters or "spring beetles," and is found with its larva in the decaying wood of old apple and other trees. The beetle, fig. 7, is about an inch and a half—sometimes more—in length, of a black color, sprinkled with numerous whitish dots. On the thorax there are two large velvety black eye-like spots, from which has arisen the common name of the insect. The thorax is about one third the length of the body and is powdered with whitish; the wing cases are ridged with longitudinal lines, and the under side of the body and legs thickly powdered with white. It is found in the perfect state in June and July; is active in the daytime, flying about with a loud buzzing noise.

Fig. 7.

The mature larva, which attains its full growth early in April, is about two and a half inches long, nearly four-tenths of an inch across about the middle, tapering slightly towards each extremity. The head is broad, brownish and rough above, the jaws very strong, curved and pointed, the terminal segment of the body blackish, roughened with small pointed tubercles, with a deep semi-circular notch at the end, armed at the sides with small teeth, the two hindermost of which are long, forked and curved upwards like hooks. Under this hinder segment is a large fleshy foot, armed behind with little claws, and around the sides with short spines; it has six true legs, a pair under each of the first three segments. Early in spring the larva casts its skin and becomes a chrysalis, and in due time emerges a perfect beetle.

This beetle, when placed upon its back on a flat surface, has the power of springing suddenly into the air, and while moving, turning its

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body, thus recovering its natural position; this unusual movement, together with its curious prominent eye-like spots, combine to make it a constant source of wonder and interest. Since it feeds only on decaying wood, it scarcely deserves to be classed with destructive insects.

THE STAG BEETLE—Lucanus dama.

This is another very common beetle somewhat similar in its habits to the eyed Elater, but very different in appearance. It is a large and powerful insect belonging to the family called Lamellicornes, or leaf-horned beetles, from the leaf-like joints composing their antennæ. In the male, fig. 8, the upper jaws or mandibles are largely developed, curved like a sickle and furnished internally beyond the middle with a small tooth; those of the female are much shorter and also toothed. The body measures from an inch to an inch and a quarter in length, exclusive of the jaws, and is of a dull mahogany brown color. The head of the male is broad and smooth, that of the female narrow and roughened with punctures. The insect appears during the months of July and August, is very vigorous on the wing, flying with a loud buzzing sound during the evening, when it frequently enters houses to the alarm of nervous occupants. It is perhaps scarcely necessary to remark that it is not in any way venemous, and it never attempts to bite without provocation.

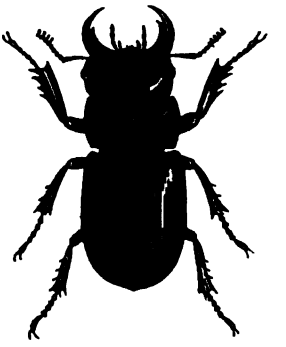

Fig. 8.

The female lays her eggs in the crevices of the bark of trees, especially near the roots. The larvæ live in decaying wood and are found in the trunks and roots of various kinds of trees, particularly those of old apple trees; they are also found in old cherry trees, willows and oaks. They are said to be six years in completing their growth, living all the time on the wood of the tree, reducing it to a coarse powder resembling sawdust. The mature larva is a large, thick, nearly cylindrical whitish worm, with a horny-looking head of a reddish brown color, dark mandibles and reddish legs. The body is curved when at rest, the hinder segments being brought towards the head.

When the larva has attained full size it remains in its burrow and encloses itself in an oval cocoon formed of fragments of wood and bark,

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cemented together with a glue-like secretion, and within this enclosure it is transformed to a chrysalis of a yellowish white color. Through the partially transparent membrane the limbs of the future beetle are dimly seen, and in due time the beetle bursts its filmy enclosure and emerges to the light of day.

As this insect affects only old and decaying trees, it seldom does much harm. The use of alkaline washes, applied to the bark of the trees in July, would probably deter these beetles, in common with others, from depositing their eggs on the trees thus coated, and any mischief they might otherwise do be in this manner prevented.

DESCRIPTION OF THE PREPARATORY STAGES OF PAPILIO PALAMEDES, DRURY. (*Calchas*, Fab.)

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—Spherical, a little flattened at base; color greenish-yellow. Duration of this stage four to five days.

YOUNG LARVA—Length .1 inch; near the end of the stage .28 inch, and then cylindrical, greatly thickened from 3 to 6; after 6, tapering to 12, then thickening to end, the back and sides after 6 a little incurved; 2 has a thin square ridge and on each curve of same a thick fleshy process, longer than others on body, thickly beset with straight hairs; there are two rows of similar processes, sub-dorsal, smallest on the narrow segments, colored as the segment they stand on, those on 12 and 13 considerably larger than any others except on 2; besides the subdorsal rows, are two dorsal, running the whole length of body, and one row on side, another along base; all these are small, simple tuberculations with hair on end; color of body brown-yellow marked with white; a white band, not very clearly defined, especially on its lower edge, passes along the side of segments 3 to 8, turning up on 8 to edge of dorsum, the two extremities there not quite meeting; 12 and 13 are white; under side greenish-brown; feet and legs same; head obovoid, a little depressed at top, smooth, shining, color yellow-brown, a shade darker than body. To 1st moult about 4 days.

After 1st Moult—Length .33 inch; same general shape, at first the

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dorsum on the thickened segments is smooth and rounded, but after a few hours becomes flattened a little, and corrugated; 2 has a thin, high, square topped ridge, the corners produced, and each bears a short thick process, pilose; on 12 are two short subconical processes, on 13 two like them but larger, and these four form part of the two subdorsal rows, which are almost suppressed on 6 to 10, but are distinct on 11; the two dorsal rows of tubercles are minute; color of body yellow-brown, darkest on posterior half, the anterior segments a little red-tinted; the white lateral band as before, but distinct, white; the dorsum and upper part of the side of 12 and 13 and a little of 11 pure white, the lower part of side less pure, the shield sordid white; over the white band, on 4, is a large sub-oval black ocellus in a narrow yellow ring; this ocellus is mostly occupied by a prominent rounded black process with many short black hairs on it; head sub-cordate, finely granulated, shining yellow-brown, with fine hairs. To next moult 2 days.

After 2nd Moult—Length .36 inch; same shape, and as before, the dorsal area on thickened segments becomes corrugated and flattened and depressed some hours after the moult, and the depression is enclosed by an elevated oval rim; 3 is a little excavated on dorsum on anterior part; 2 is a square-topped ridge, but the processes have passed away; on 12 and 13 the processes as at previous stage, but the rest of the subdorsal rows have disappeared, and in place of part of them are slight rounded elevations, like those of the dorsal rows; so that on 3 there are two dorsal and two subdorsal rows of these knobs, but two dorsal only on 4, 5, 6; on 9 and 10 are two subdorsal little round lilaceous spots; color yellow-brown to dark brown, the anterior parts having most yellow; the sides of the posterior segments of a black hue; the white side stripes as before; 12, 13 white, the shield greenish-brown above but white below, and the anal claspers white; the white extends into the sides of 11, but the brown dorsal area runs back in a sharp point nearly to 12; on 4 the eye-spot is large, flattened in front and there velvet-black, but behind this is a prominent black vitreous bead-like elevation, smooth and without hairs; instead of a complete and uniform ring there is a thickening of the yellow above and below the eye-spot, and the ends are narrowed, so that the appearance is much like that of eye-lids; head as before, and it and segment 2 are one color, honey-yellow. To next moult 3 days. But one larva, after 2nd moult, differed from all the rest, being uniform light yellow-brown, the white area on 11 and 12 yellowish.

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After 3rd Moult—Length .8 inch ; same shape and general color, the anterior segments a little darker, and their surfaces finely and thickly, but indistinctly, dotted green ; the middle segments lighter colored and distinctly dotted green ; the side bands salmon color, the last segments a redder salmon ; 13 white above base at extremity ; along base of body, with and a little above the spiracles, a white macular band ; on dorsum of 13 two small conical white processes (none on 12) ; on dorsum of 5 are two abbreviated bars of red-lilac, one on each side, in the subdorsal row, and on 6 to 10 is a small rounded lilac spot on each in same row ; on the side of 8 to 10 one similar spot to each ; on 3 to 6 low rounded knobs as at previous stage ; below the basal ridge is a small indistinct blue-lilac spot on each segment from 6 to 11; the ocellus as at previous stage, the buff ring now open at anterior side ; head as before, but greenish-yellow.

Towards the last of this stage the brown area has a green tinge, and the green dots become quite distinct, and the side bands are greenish ; the circlet of the eye-spot changes to red-buff. Later the top of the anterior segments became olive green, the dorsum after 5 light green, edged down the sides by dark green ; the side band pale green, as are the last segments ; under side pale greenish-brown ; the lilac spots unchanged ; the spots below spiracles blue. To next moult 4 days.

After 4th Moult.—Length 1.1 inch ; 9 days after the moult reached maturity.

Mature Larva—Length 1.6 inch ; cylindrical, the segments 3 to 5 much thickened, arched dorsally, then tapering to last ; color dull velvety-green, on 3, 4, 5, and on 12, 13 nearly solid, but a little specked with lighter green ; the other segments light and dark green in fine markings ; the basal ridge whitish-green ; under this is a fine black line from 3 to 12, and on 6 to 11 is a subtriangular blue spot in black edging on each segment just below the line ; 2 has a narrow yellow ridge in front, nearly flat on top, the curves rounded ; on anterior side of this and next it is a black subdorsal dash on either side ; behind the ridge is a black, rough or shagreened narrow band ; the scent-organs light yellow-brown ; on the side of 4 is a black ocellus, upon which rises a rounded vitreous black process, the circlet orange-red, having a black stripe within its anterior edge, and a blue spot on its upper outer side ; on 5 to 11 are four rows of small blue-lilac spots, each in fine black ring, two of the rows

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being subdorsal, two lateral; on 12 only the two dorsals are present, on 13 neither; on the dorsum of 5 at posterior edge is a buff spot just outside the liiac spot and touching it. Under side deep ochre-buff; feet and legs greenish-brown; head subovoid, bilobed, granulated, with a dull gloss; color olive-green.

Gradually the larva changes, the specks disappear on the anterior and also on the last segment, so that the extremities are solid green; on the middle segments the specks and marks become less distinct; the ridge at base becomes yellow, the whole under side port wine color; all the lilac spots change to bluish, the two spots on 5 to brown-buff.

Finally, before suspension the whole surface becomes dull ochrey-yellow, like *P. Troilus* at same period, the red of lower side becomes dull and yellowish, or dull salmon, the lilac spots on back change to pale black, but the spots below the basal ridge retain their blue color, but are dull. One day after suspension the larva pupated.

CHRYSALIS—Length 1.4 inch; greatest breadth .38 inch; the ventral side highly arched, the dorsum much incurved, the former narrow at summit, particularly on the thoracic segments, rounded, the sides sloping; the dorsum rounded, the sides somewhat flattened to the lateral ridge, which is prominent, carinated, and extends from end to end; head-case long, flattened transversely and about equally on the two sides, narrowest at base and widening gradually to the tips of the ocellar prominences; these are long, subpyramidal, divergent, the space between excavated roundly; mesonotum low, the sides very little convex, on the top a very small pyramidal elevation; surface all finely granulated; color variable; one phase shows the whole dorsal side a delicate green, with a darker green medio-dorsal stripe from mesonotum to last segment; below mesonotum two sub-dorsal low red tubercles, one on either side; on either side of the abdominal segments two rows of dull lilac points, forming a cross row of four to each segment; whole ventral side one shade of green, a little darker than dorsum and less yellow; the lateral ridge cream-color, more or less marked by a red line, which broadens on the process of head; on the ventral side below the head two red dots near the middle line; a series of white dots along the margins of wing cases; below the ridge, on last segments, are traces of blue spots.

Another resembles the above described, except that there is a yellow shade over the dorsal elevation and the medio-dorsal stripe is red.

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Others are quite unlike these; the head case and mesonotum are yellow-brown, and the rest of the dorsal side is yellow-brown with a pink tint; the stripe and the ridge brown; the dorsal spots blue, and dull blue spots below the ridge; whole under side light yellow-brown.

No butterflies from my larvæ emerged the same season. But of four chrysalids found in Florida 11th to 13th Sept., 1880, two gave butterflies 25th and 27th Sept., and two over-wintered, the butterflies emerging 2nd and 3rd Feb.

I received 24th August, 1880, from Dr. Wm. Wissfeld, Indian River, Fla., about a dozen larvæ of *Palamedes* in 1st and 2nd stages. My correspondent wrote: "On 15th I confined 2 ♀ in bag over limb of Persea carolina, or Red Bay. One began to lay eggs within a short time, and in an hour had laid 26. The other was heavy with eggs but would not lay till to-day, and has laid 7 eggs." These were sent me with leaves of the food plant, in a tin box per mail, and I received them 24th, the leaves still fresh, and the larvæ, which had hatched on the road, feeding. As this food plant is not found here I tried the larvæ with leaves of orange and lemon, to no purpose. But sassafras they took to at once. This is the food plant of *P. Troilus*, a species belonging to same sub-group as *Palamedes*. I had no difficulty in raising the larvæ to chrysalis. They are sluggish, like the larvæ of *Troilus*, and in general behave in same way, at all stages resting on a lining of silk which they had spun on middle of the leaf, whereby the leaf is curled or drawn together so as to afford a concealment. This they rarely leave, and then only when hungry, feeding on the end of the leaf until it becomes too small for a hiding place, after which they betake themselves to another leaf. But these larvæ do not cut into the side of the leaf and fold down the cut portion, as *Troilus* does. This Dr. Wissfeld states in reply to my inquiries. He farther says: "*Palamedes* roosts on the highest tree it can find, oak or palmetto. I have seen four to six near sundown fluttering about the tree, where they finally settled and remained. Sometimes three or four so roost on one large palmetto leaf."

DIFFERENCES WITHOUT DISTINCTIONS.

BY C. E. WORTHINGTON, CHICAGO, ILL.

If there is one thing more than another that fills the brain of an amateur Entomologist with despair, when he first makes the acquaintance

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of the long lists of largely incongruous and incomprehensible names that he is expected to master, it is the utter absence of anything in the system of nomenclature tending to show the relations of various forms to each other, or of varieties to the parent or more abundant form. There is nothing to show at a glance the results of the experience of others and to attain any idea of the true relationship of allied forms. The student must either acquire the knowledge by slow and persevering experiment, or oftentimes forego the acquisition altogether, because time and the rarity of books will not permit him to gain it. We cannot start where others left off, but must follow their paths step by step, only hoping to gain the point they reached soon enough to be able to penetrate a little further.

Most conspicuously is this the case as regards the so-called varieties of variable species. Let a student in England, for instance, take up Mr. Edwards' Catalogue of North American Butterflies, and the first species is listed with three "dimorphic" varieties and one "sub-variety." The theory of their origin is well known, and the facts regarding their appearance at certain seasons, but this cannot be learned from the list, and must be gained from various contributions on the subject written at many times and distributed through many books—a comparatively easy task as regards *Papilio ajax*, though less easy were the researches of some species in question conducted by an obscure author and published in some rare book in a foreign language.

Under the present system *Papilio Walshii*, *Pieris pallida* and *Grapta umbrosa* are designated dimorphic varieties, although no two of them bear the same or similar relations to the species to which they belong.

It is hardly to be expected that we can arrive at an exact and universally acceptable definition of a species, or that the time will soon come when extremists for the sake of advertisement or other reasons will not persist in declaring accepted species as mere varieties or *vice versa*, or that such persons will cease to set dictum above experiment; but it does not seem impossible to adopt some system that shall indicate to a certain extent the relations of many forms, and at the same time elastic enough to be acceptable to all.

For the purposes of this article, however, I consider it necessary to submit a brief description of what I hold to constitute a species, in the hope that it will substantially agree with the conceptions of others in the main.

We may define a species as an aggregation of individual forms of life

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having the same general characteristics, but exhibiting definite, transmittable structural differences from all other forms of life—a definition which does not touch the construction of genera.

From each species are given off from time to time individuals in greater or less numbers differing from the parent form and from any other species; these forms sometimes exhibit transmittable differences, sometimes not transmittable, but in nearly every case are connected by almost imperceptible gradations or known circumstances of origin with the form from which they sprung, the extremes of variation being sometimes so great that in the absence of knowledge of intergrades or attendant circumstances, they would readily be declared distinct species.

In the case of those species where the departures from the normal form appear at all seasons and in all broods without restriction to locality and with satisfactory intergrades, it seems to me that a good end would be served by ceasing to consider them "varieties," but merely terming them "variations" and designating the extremes of variation by letter, as Variation A, or by name, if the practice be more agreeable, as in the case of *Catocala scintillans*, a name given to an extreme variation of *C. innubens*, which occurs in all broods without restriction to locality and with perfectly satisfactory intergrades, which would thus become Variation *scintillans*—a name that would at once express its relation to *C. innubens*.

Thus relieved of an embarrassing number of forms whose title to the dignity of varieties is, to say the least, dubious, we might classify actual varieties as follows:

Seasonal—Where a certain variation of form appears only or mainly in certain broods of many brooded species, disappearing in following broods only to reappear in the succeeding year at its proper season, as *Papilio Walshii*.

Climatic—Where varieties occupy considerable habitats, often to all appearance distinct species when viewed at the extremes, but having common ground where intergrades occur or either form is produced indiscriminately, as in the varieties of *S. alope*.

Dimorphic—Where well marked varieties do not thoroughly intergrade, but appear in all broods and are produced indiscriminately regardless of sex, as in *Grapta comma*.

Occasional—When aberrant forms are produced in both sexes rarely and at irregular intervals, as *Papilio Calverleyii*.

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Melanic or Albinic—Male or female, or local, the names of which are sufficient definition.

This would not preclude the use of the term sub-variety as now used, but would open the way for the use of the still more expressive term of "sub-species," applicable to varieties highly differentiated, and especially when the differentiation has so far progressed as to begin in the larval state.

Would not the application of some such system to the catalogues be of much aid in study and designate approximately the relations of many forms to each other?

I offer this as a suggestion; the subject will certainly bear discussion, and some permanent good may come of it surely. If the result of the discussion is the adoption of the system herein indicated, after elaboration and revision, or of some other system that will in some way indicate the relationship of forms in their names, my end will be attained. That some reform is necessary I am convinced.

THE NORTH AMERICAN SPECIES OF MAMESTRA, Ochs.

BY A. R. GROTE.

The species of this genus have hairy eyes, unarmed tibiæ and a tufted thorax. The dorsum of the abdomen is more or less tufted, but in some species the tuftings are not noticeable. Several species which seem to me to belong to *Graphiphora (Taeniocampa)* have been referred to this genus; among these I may mention *orobia* of Harvey, *modesta*, *incincta* and *thecata* of Morrison, and the species described by me as *rufula* and *puerilis*. I also take out the *curta* and *promulsa* of Morrison, which I believe to be species of *Anarta*. The species included under *Dianthoecia* differ from *Mamestra* by the extruded ovipositor. But they appear to arrange themselves naturally among the species of *Mamestra*, and perhaps do not really differ in a generic sense. They are here included.

purpurissata *Grote*, P. Ent. S. Phil. 3, 82. Can.; Eastern and Middle States.

nimbosa *Guen.*, Noct. 2, 77; Speyer, Ent. Can.; Zeit. 142. Eastern and Middle States.

discalis *Grote*, Bull. U. S. Geol. Surv., 3,797. Colorado.

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imbrifera *Guen.*, Noct. 2, 76. Can.; Eastern and Middle States.
latex *Guen.*, Noct. 2, 78. Can.; Eastern and Middle States.
† condita *Guen.*, Noct. 2, 78, pl. 8, fig. 5. "New York."

N. B.—This species is not known to me. In some collections I have found *Dianth. lustralis* determined as "*condita.*" But from his figure and description, which latter I here translate, Guenée's species must be quite different.

"♀ 35 m. m. The smallest of the genus (i. e. *Aplecta*). Wings slightly elongate, the primaries nearly entire, rather wide, of a grayish white much powdered with blackish, which makes them griseous; except the edges of the lines and the two ordinary spots which remain white and empty. These latter are very regular; the orbicular longitudinally ovate. The three first lines very distinct, dentate, black; the t. p. line sending a sharper tooth in the sinus of the reniform. The subterminal very nebulous, pale, margined anteriorly by a vague shade of pale ferruginous; the upper edge of the claviform alone visible. The two median spots separated by a dark shade surrounded by black. A basal black ray crosses the half-line. Secondaries dirty yellowish white, with traces of a discal spot, of a much twisted median line and of a sub-anal blackish spot. Terminal marks thick, contiguous and better marked. Beneath with the spot and line well indicated, blackish, thick, the line continuous on the primaries. Abdomen short, with small crests. Palpi ascending, slighter than in the other species (i. e. of *Aplecta*)."

This description and the figure of Guenée differ throughout from *lustralis*. In my List I originally transferred Guenée's Aplectas to this genus.

adjuncta *Boisd.*; Guen. Ind. 243; Noct. 1, 199. Can.; Eastern and Middle States.
lubens *Grote*, Tr. Am. Ent. Soc., 113, 1875; *rufula* Morr., P. A. N. S. P. 62, 1875; *lubens* Morr., P. B. S. N. H. 119, 1875. Can.; Eastern and Middle States.
Beanii *Grote*, Can. Ent. 9, 87; N. Am. Ent. 1, 12. Texas; Illinois.
legitima *Grote*, Proc. Ent. Soc. Phil. 3, 82. Can.; Middle, Western and Eastern States.
liquida *Grote*, Papilio, 1. Washington Territory.
lilacina *Harvey*, Bull. B. S. N. S. 2, 119. Middle States.
illabefacta *Morr.*, P. B. S. N. H. 141, 1874. Eastern and Middle States.

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N. B.—This is in my opinion a more obscurely colored grayish-brown form of the preceding.

noverca *Grote*, Can. Ent., 10, 236. Nebraska; Cal.; Col.

Goodellii *Grote*, Can. Ent., 7, 223. Eastern and Middle States.

assimilis *Morr.*, Bull. B. S. N. S. 2, 119. Eastern and Middle States.

rosea *Harvey*, Bull. B. S. N. S. 2, 119. Can.; Eastern and Middle States.

congermana *Morr.*, Can. Ent. 6, 106. Eastern and Middle States.

vindemialis *Guen.*, Noct. 1, 344; Grote Proc. Ac. N. S. 418, 1875; *Ceramica rubefacta* Morr. Can.; Eastern and Middle States.

† w-album *Guen.*, Noct. 1, 345. "Florida."

picta *Harris*, Ins. Inj. Veg., 329; *Ceramica exusta* Guen., Noct. 1, 344. Can.; Eastern and Middle States.

N. B.—I am indebted to Prof. Fernald for a bred specimen of *picta;* there is a slight divided thoracic crest and I do not see the necessity for disturbing the original generic reference of Harris. The following seven species have the typical markings of the genus.

Farnhamii *Grote*, Bull. B. S. N. S. 1, 138, pl. 3, fig. 2. Colorado.

grandis *Boisd.*, Gen. 950; Led. Noct. 90; Guen. Noct. 2, 105, pl. 8, fig. 10. "Greenland:" Can. to Middle States.

nevadæ *Grote*, Bull. B. S. N. S. 3, 84. Nevada.

subjuncta *G. & R.*, Tr. Am. Ent. S. 2, 198, pl. 3, fig. 71; Grote B. B. S. N. S. 2, 12. Can.; Eastern and Middle States.

atlantica *Grote*, B. B. S. N. S. 2, 12; Grote Check List 6; var. *discolor* Speyer, S. E. Z. 142.

N. B.—This may be = the European *dissimilis.*

Dimmockii *Grote*, Proc. A. N. S. Phil., 420, 1875. Eastern and Middle States.

distincta *Hubn.* Samml.; G. & R. Tr. Am. Ent. Soc. 2, 197, pl. 3, fig. 72; Grote, B. B. S. N. S. 2, 156 *(Mamestra); Dicopis vitis* French, Can. Ent. 11, 76. Middle and Western States to Tex.

mucens *Hubn.* Zutr. 515–16; Grote Can. Ent. 11, 206. Same localities as preceding.

confusa *Hubn.*, Zutr. 495-6; Grote Bull. B. S. N. S. 2, 12. Same localities as preceding.

trifolii *Rott.* Nat. 9 & 131; *albifusa* Walk. B. M. Cat.; *chenopodii* S. V.; Speyer S. E. z. 138. New York to Oregon.

N. B.—The Oregon specimens are more concolorous, without the prominent W-mark of the s. t. line relieved by darker preceding dashes.

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Speyer, who calls the N. Am. spec. from N. Y. var. *major*, says that *trifolii* is found on the old continents from Spain to Peking.

chartaria *Grote*, Bull. B. S. N. S. 1, 138, pl. 4, fig. 12. California.
defessa " Can. Ent. 12, 88. California.
pensilis " P. A. N. S. P. 199, 1874. Vancouver; Sauzalito, Cal.
vicina " Bull. B. S. N. S. 2, 119; *teligera* Morr. New York to Texas.

N. B.—To this form *pensilis* is nearly allied; the extension of the ovipositor does not seem to be a constant feature. I have a specimen from California, " Shasta," which seems to be the same as the Eastern *vicina*. Again I have an Illinois specimen which indicates a closely allied but probably distinct species from the East.

anguina *Grote*, n. s.

♂. Allied to *vicina*, but with the t. p. line drawn in below the reniform, narrowing the median space below the vein. No red or brown tintings. Median space shaded with blackish. The general color is gray; the stigmata pale, much as in *vicina*, except the claviform, which is much larger and wider, while it also extends across to t. p. line. A distinct black dash at internal angle to s. t. line at its sinus on submedian fold. Hind wings white with soiled borders. No dark dashes before the subterminal line which are in both *pensilis* and *vicina*. *Expanse* 28 mil. Illinois, Dr. Nason, May 31.

acutipennis *Grote*, Can. Ent. 12, 214. Nevada; Arizona.

N. B.—Also closely allied to *vicina*. The fore wings appear more elongate and sharper.

capsularis *Guen.*, Noct. 2, 22, pl. 8, fig. 3; *Paphia propulsa* Walk. 529. Middle States.
detracta *Walk.* C. B. M. 732; *claviplena* Grote, B. B. S. N. S. 1, 194. Can.; Eastern and Middle States.
cuneata *Grote*, B. B. S. N. S. 1, 139, pl. 4, fig. 9. California; Wash. Territory.
brachiolum *Harvey*, Can. Ent. 8, 6. Texas.
marinitincta " Bull. B. S. N. S. 2, 273. Texas.
laudabilis *Guen.*, Noct. 2, 30, pl. 8, fig. 4. *Var.* illaudabilis *Grote*, Can. Ent. 7, 127. Alabama, Tex. to California.

N. B.—The typical *laudabilis* has the median space shaded with reddish. The var. *illaudabilis* from Cal. and Texas has it filled with black, and the base of the wing and thorax often shaded with black. Another

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interesting Californian specimen has the fore wings concolorous dusky greenish, but I do not think is a different species, though this is possible. Guenee refers the species to *Hecatera*, but I have classified it as a *Mamestra;* it is allied to the species with which I here associate it.

4-lineata *Grote*, Bull. B. S. N. S. 1, 140, pl. 4, fig. 15. California.
olivacea *Morr.*, Proc. B. S. N. H. 143, 1874. Can. to Vancouver.
alboguttata *Grote*, Bull. B. S. N. S. 3, 85. Oregon.
comis " " " Vancouver.
sutrina " Papilio 1, 5. Colorado.
lustralis " Can. Ent. 7, 223. Middle and Western States.
meditata " Bull. B. S. N. S. 1, 104. Eastern and Middle States.
innexa " " 2, 123. Texas.

N. B.—Mr. Morrison has referred this species to *Mamestra*, in correction of my original determination.

renigera *Steph.* 2, 16; Grote, Can. Ent. 6, 132 *(Mamestra); herbimacula* Guen. Noct. 1, 133. Can.; Eastern and Middle States.
cinnabarina *Grote*, P. B. S. N. H. 241, 1874. *Var.* ferrea *Grote.*

N. B.—This species is allied to the European *M. strigilis* and *fasciuncula.* The var. *ferrea* occurs in Vancouver Island (Can. Ent. 7, 25) and Washington Territory (Morrison leg.) The fore wings are different shades of yellowish ferruginous, while they are more brownish in the typical form from California.

lorea *Guen.*, Noct. 1, 126. Can.; Eastern and Middle States.
niveiguttata *Grote*, B. B. S. N. S. 1, 194, pl. 4, fig. 16. California.
leucogramma " " 1, 140. California.
palilis *Harvey*, " 2, 273. Texas.
† repentina *Morr* P. B. S. N. H. 118, 1875. "New Jersey."
† ectypa " " " "West Virginia."
insolens *Grote*, Bull. B. S. N. S. 2, 65. California.
arietis " Bull. U. S. Geol. Surv. 5, 207. California.

N. B.—This may be the ♂ of *insolens;* it is very different in appearance from the more distinct markings.

? quadrannulata *Morr.*, P. A. N. S. P. 430, 1875. Nebraska.
? rugosa " Proc. B. S. N. H. 119, 1875. Maine.
† Rogenhoferi *Moeschl.*, S. E. Z. 269, 1870. "Labrador."
† subdita " W. E. M. 363, 1860, T. 9, fig. 7. "Labrador."
† phoca " " 197, 1864, T. 5, fig. 15. "Labrador."

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NEW NOCTUIDÆ, WITH LIST OF THE SPECIES OF PERIGRAPHA.

BY A. R. GROTE.

Agrotis nanalis, n. s.

♀. The smallest species known to me. All the tibiæ spinose; eyes naked; body untufted. A slender species which may be compared with *opaca*. The fore wings are blackish with the lines lost. The stigmata are concolorous, difficult to make out. The orbicular is elongate, the reniform vague, upright, broad; the spots are picked out by a brown shading which fills the cell and marks the subcostal and median veins. S. t. line a vague blackish even shade. Hind wings concolorous fuscous griseous, with the veins soiled and a faint discal mark. Beneath griseous, the primaries a little brownish. The costal preapical dots visible beneath and to be made out on the upper surface. Abdomen like hind wings. Head brownish; tegulæ blackish, disc of thorax paler. *Expanse* 26 mil. Nevada.

Agrotis esurialis, n. s.

This species has all the tibiæ spinose. In color it is like *perconflua*, being of a pale ruddy brown over ochrey. The stigmata are concolorous, and as in *Normaniana*, set in a black spot. The orbicular nearly touches the reniform inferiorly, leaving a blackish brown v-shaped space between the stigmata. The orbicular is open to costa, oblique, widening above, preceded by a narrow black shade on the cell. Reniform widening inferiorly, constricted, upright. Lines dark; t. a. line single, marked on costa above the orbicular, sinuate, incomplete. T. p. line indicated by venular dots, as also the s. t. line, which is followed by a faint narrow pale shade and is inaugurated on costa by a curved mark. The species seems to belong to the series of *rubifera*, *perconflua*, *Hilliana*, *conchis*, *Normaniana*. Hind wings pale fuscous with the fringes and outer edge colored like primaries. Head a little paler than thorax, with the palpi darker at the sides. Abdomen at the sides and beneath tinged with rosy brown. Wings beneath tinged with ruddy, especially on the margins and outside of the extra-mesial fuscous line. Discal marks indicated. *Expanse* 31 mil. Washington Territory, coll. by H. K. Morrison.

Agrotis colata, n. s.

♀. Like *Versipellis*, but a little larger and without the white lines on

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the veins. Entirely dark purply brown; thorax and head reddish brown. Stigmata a little hoary; orbicular large, open; reniform wide; claviform indicated. Lines very faint; an indistinct paler shade following the t. p. line; the terminal space also indistinctly paler. Hind wings concolorous, dark fuscous. Mount Hood; one fresh female specimen. Cannot be confounded with any other species from the color and its affinity with *versipellis*.

Agrotis semiclarata, n. s.

♂ ♀. Allied to *gravis* and *Vancouverensis*, smaller than the latter and without the pale cast of *gravis*. A thick dark brown basal dash extending into the claviform, and faintly cut by the t. a. line. Rich brown with the costal region (especially in the ♂) suffused with darker. Spots concolorous; cell shaded with black. S. t. line pale, without the small teeth at the middle and below apices of its allies. Head and collar rich yellow brown; tegulæ shaded with pale, but not so pale as in *gravis*. Beneath the costal half of secondaries is fuscous, leaving the lower portion of the wing including the border pale; a spot and common line. Above the hind wings are fuscous and rather dark in both sexes. This species may be known by the hind wings beneath being half pale, including the lower portion of the border, which is usually darker. The three species, *gravis*, *vancouvereńsis* and *semiclarata*, are nearly allied; their Eastern allies seem to be *volubilis*, *venerabilis* and *stigmosa*.

Xylomiges perlubens, n. s.

♂. Allied to *rubrica*. Fore wings variegated with reddish and gray. Lines double, brownish, marked on costa by blackish dots. Orbicular pale, with brown centre and blackish annulus, upright; reniform with an inferior stain, a curved reddish inner streak, indistinct outwardly. Veins blackish. T. p. line followed by white venular points. S. t. line preceded by a deep reddish shade marked opposite the cell and again below vein 3. Terminal space blackish with a gray apical patch. External margin dentate; fringes cut with pale. Hind wings and fringes pure white; a broken terminal line; beneath with a dotted extra-mesial line and discal spot. Primaries beneath with the terminal space whitish; subterminal space stained with brownish; a discal mark very near the dotted extra-mesial line which hardly reaches the margin. Eyes hairy; tibiæ unarmed; antennæ brush-like; abdomen tufted at base. Wings elongate. Thorax and head reddish brown; collar edged with gray; abdomen pale reddish

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fuscous. *Expanse* 39 mil. Washington Territory, collected by H. K. Morrison.

Perigrapha Led.

The North American species which I refer to this genus differ from *Graphiphora (Taeniocampa)* by the thorax having a sharp ridge of scales. The stigmata are usually large and confluent. The eyes are hairy; tibiæ unarmed. The genus *Stretchia* of Mr. Hy. Edwards is based on a species of *Perigrapha*. I had made one Californian species the type of the genus *Acerra;* but I believe this now well-known species *(normalis)* is not generically distinct from the European species.

normalis *Grote*, Bull. B. S. N. S. 2, 162; Check List fig. 4. California.
muricina " " " 3, 85. Oregon.
Behrensiana " Can. Ent. 7, 71. California.
plusiiformis *Hy. Edw.*, Pac. Coast Lep. 4, 3. Nevada.
erythrolita *Grote*, Can. Ent. 11, 208. California.

Bomolocha fecialis, n. s.

♀. Similar to *bijugalis;* the basal half of the primaries is of an even rich but comparatively pale brown, not blackish brown as in its ally. It encloses a discal dot and is limited inferiorly by a white flexed oblique line which does not attain the margin. The brown portion of the wing is limited by the white upright and undulate t. p. line, which is not so sharply produced at median vein as in its ally. Subterminal line very faint and the usual apical streak quite undecided. Outside of the t. p. line the wing is paler, but not so white as in its ally. The expanse is the same. New York. This may be a varieiy of *bijugalis*, but it looks quite different. It cannot be a sexual form as I compare it with ♀ *bijugalis.*

Bomolocha? incusalis, n. s.

♀. A slender bodied form with the wings a little narrower than in our Eastern species; the palpi a little shorter; the abdomen smooth. The entire insect is faded dusty ochrey with the median space of primaries dark brown and contrasting. It is bounded by the two median lines, the first even, upright, nearly straight, a little oblique. The outer line curves inwardly below median vein, forming an arcuation to internal margin; it is followed by a faint line, sometimes not noticeable. S. t. line darker than the wing, irregular, vague. Hind wings with faint traces of lines. The comparatively narrow dark median space of primaries above shows a

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discal mark. *Expanse* 23 mil. Colorado Rio (Prof. Glover); Arizona (Mr. Hy. Edwards). The shorter labial palpi and the wings narrower at base may distinguish this species generically. I regret not to know the male, which would decide the genus.

Deilinia glomeraria Grote.

In a letter, with regard to the species of *Deilinia* described in the March number of *Papilio*, Mr. G. R. Pilate says: "I have the male of *glomeraria* and it is not different from the female, the antennae are not pectinated. I find I have no males of *septemfluaria*. They are both common insects early in the spring, before the leaves are out, but are difficult to catch, as they are disturbed by the slightest noise and fly with the wind, which generally blows pretty hard at that time of the year. I have seen them go up out of sight." Dr. Packard, to whom I submitted these species, stated that he thought he had seen specimens of *glomeraria* from a different locality, but neither species is apparently included in his work on the family.

ON SOME NEW SPECIES OF CHALCIDIDÆ FROM FLORIDA.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Group Eurytomides.

EURYTOMA VAGABUNDA, n. sp.—♀. Length .10 inch. Deep black. Head and thorax coarsely punctate; antennæ 8-jointed, black and pubescent; eyes black; thorax black, very coarsely punctate, collare transverse quadrate, parapsidal grooves indistinct, scutellum hardly separated from the praescutellum, convex, narrowing but rounded posteriorly; metathorax coarsely punctate; abdomen black, smooth, and highly polished, peduncle short, a series of very fine punctures along the basal margin of 2nd, 3rd and 4th segments, only perceptible with a high power, tip pubescent; wings hyaline, iridescent; veins slightly yellowish, no stigmal spot; legs reddish yellow, tibiæ slightly paler, feet pale.

Captured on Spanish Bayonet (*Yucca* sp.)

DECATOMA FLAVA, n. sp.—♂ and ♀. Length .12 to .15 inch. Head, thorax, abdomen, antennæ and legs a bright greenish yellow; head and thorax rather coarsely punctured; ocelli brown, eyes light brown with

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darker spots; 2nd antennal joint slightly reddish; tips of mandibles brown, palpi whitish; wings hyaline, iridescent, ligaments of wings brown, stigma brown black, a large dark blotch extending from stigma across to near the hind margin, and in some specimens a slight indication of another blotch between this and base of the wing; abdomen smooth and shining, very slightly infuscated on dorsum; a brown spot at base of posterior coxæ; outer surface of posterior femora dark brown excepting at base and tip, inner surface more of a reddish brown.

Described from 8 specimens, 2 ♀ and 6 ♂, bred from an oak gall (*Cynips q. ficus* Fitch?)

DECATOMA QUERCI, n. sp.—♂. Length .12 inch. Head green, slightly yellowish and coarsely punctate, vertex enclosing ocelli brownish black, mandibles tridentate, tipped with black, gula black; eyes greenish brown with darker spots; antennæ 7-jointed, pubescent, greenish yellow, 3rd joint dark; thorax coarsely punctate and slightly hairy; collare transverse quadrate, but broader than mesonotum, greenish yellow, with a slight darker transverse band of brown in centre; mesonotum, scutellum and metathorax dark reddish brown; parapsidal grooves indistinct; scutellum longer than broad and posteriorly rounded; abdomen smooth, shining black or brownish black, more or less of a reddish brown anteriorly, peduncle two-thirds as long as abdomen, black; wings hyaline, veins hyaline, stigma black, with a brownish black blotch extending from it to more than half way across the wing; legs, anterior pair greenish yellow, middle tibiæ infuscated, posterior tibiæ brownish black, tarsi black.

Raised from a dipterous gall on *Quercus Catesbæi.*

DECATOMA LANÆ, n. sp.—♀. Length .08 to .10 inch. Honey yellow. Head finely punctate, thorax coarsely punctate; a small black spot on vertex hardly enclosing ocelli, the latter yellowish; tip of mandibles black; antennæ 8-jointed, honey yellow and gradually increasing in size to tip; collare narrow; scutellum somewhat oval, narrowed anteriorly and with the disk brown; abdomen yellowish red, dorsum infuscated, peduncle short, posteriorly brown or black; wings hyaline, stigma black and the blotch smoky and hardly extending half way across the wing; legs yellowish, posterior tibiæ only black or brownish black.

♂. Differs very little from above excepting in size, a longer peduncle and in antennæ being but 7-jointed.

Described from numerous specimens raised from a woolly gall (*Cynips q. Turnerii* Ashmead) on *Quercus aquatica.*

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DECATOM PHELLOS, n. sp.—♂. Length .10 inch. Head brown black, finely punctate; eyes greenish brown; antennæ 7-jointed, scape and joints 3 and 4 dark, balance rufous, thorax dark brown, coarsely punctate; collare broader than mesonotum, beneath reddish brown, parapsidal grooves almost obliterated; scutellum convex, coarsely punctate; abdomen smooth, black and shining, peduncle brownish, hardly the length of abdomen; wings hyaline, veins slightly yellowish; stigma black, smoky blotch beneath extending more than two-thirds across the wing; legs honey yellow, coxæ dark, middle femora and tibiæ slightly darker, posterior femora and tibiæ brown black.

Raised from gall on *Quercus phellos*.

DECATOMA FOLIATÆ.—♀. Length .10 inch. Head black, coarsely punctate; eyes brown; antennæ 9-jointed, brownish, sparsely pubescent; scape yellowish, last three joints somewhat connate; thorax coarsely punctate, collare attenuated and a beautiful orange yellow; some specimens have only the corners so colored; abdomen brownish black, smooth and shining; wings hyaline, veins almost hyaline, slightly yellowish, a large black circular stigma with tip of stigmal vein protruding, iridescence strongly defined on hinder wings, the whole outer margin sometimes being a beautiful violaceous; legs a beautiful bright orange yellow, with tarsi and feet slightly paler and posterior coxæ black.

♂. Length .08 inch; 2nd joint antennæ larger, scape black, corners of collare orange yellow, peduncle two-thirds as long as abdomen, coxæ black, stigma spot somewhat triangular; palpi and labrum yellowish white; otherwise same as ♀.

Described from numerous specimens raised from leafy live oak gall, *Cynips q. foliata* Ashmead.

DECATOMA BATATOIDES, n. sp.—Length .15 of an inch. This species in punctation and shape very much resembles *D. foliatæ*, but may be easily distinguished by the following differences: In size; eyes, face and antennæ brown, mouth parts and palpi yellowish, coxæ and legs a uniform lemon yellow, collare and mesothorax lemon yellow, sternum black, sutures of parapsides yellowish, posterior margin of scutellum yellowish and stigma a mere dot.

Described from several specimens bred from the live oak potato gall, *Cynips q. batatoides* Ashmead.

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ON THE EARLY STAGES OF HYPENA SCABRA, FABR.

BY D. W. COQUILLETT, WOODSTOCK, ILL.

EGG.—Globular, slightly flattened above, more decidedly so below; lower half smooth; upper half deeply grooved, the interspaces rounded and marked with fine transverse impressed lines; whitish, the upper half sometimes dotted with dark brown; transverse diameter nearly ½ mm. [The top of this egg closely resembles that of the unarmed Rustic *(Agrotis saucia)* figured in Riley's 8th Report, page 37, fig. 24.]

LARVA.—First Stage: Body green; a dark colored dorsal line, edged each side with a whitish line; a white subdorsal and stigmatal line; piliferous spots green, each bearing a short black hair; venter green; head polished green; body provided with only 14 legs. When jarred from their perch the larvæ hang suspended by a silken thread. I observed only two moults in these larvæ, and the color and markings after each moult are the same as in the first stage. Length at maturity about one inch.

CHRYSALIS.—Of the usual form, dark brown; length about 14 mm.

On the 15th of May, 1880, I enclosed a moth of this species in one of my breeding cages in which some red clover was growing; the next day it deposited about 50 eggs, placing them singly on the under side of the leaves, and rarely upon the stems of the clover, sometimes consigning several eggs to the same leaf. They hatched out on the 23rd of the same month, and all of the larvæ reached maturity at about the same time, and then crept beneath dead leaves, etc., and spun their cocoons. The first moth issued June 28, and the last one July 2.

On the 6th of July of the same year I obtained another laying of eggs, and the larvæ from these, like those from the first laying, all reached maturity at about the same time.

A larva which I found July 11, 1879, spun its cocoon August 22nd, but died before producing the imago; another spun its cocoon September 6th, disclosing the imago Sept. 18th. On the 30th of October, 1880, I

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found a fresh female of this species in a shock of corn; the moth was killed the same day and her ova were found to be undeveloped, from which fact, and the situation in which the moth was found, it is very probable that the imago hybernates. The moth from which I obtained the first laying of eggs was very much faded and worn, and presented all the appearance of having hybernated. Prof. C. V. Riley also holds the opinion that the imago hybernates, and adds* that in more southern localities the chrysalids also hybernate, as he has taken them under bark in the winter. He states that the larvæ also feed upon *robinia*, but I have never taken them upon any other plant than clover *(Trifolium pratense)*.

There appears to be only two broods produced in one season in this latitude; I have never taken the larvæ later in the season than the first week in September, and female moths enclosed in my breeding cages at this time refused to deposit their eggs, although earlier in the season they deposited eggs readily in confinement.

Scabra is very abundant in this locality, frequenting clover meadows in company with *Plusia precationis* and *Drasteria erechtea*. When flushed it flies very rapidly a short distance and then suddenly alights upon a leaf and quickly crawls to the under side, concealing itself as much as possible from sight.

Below is given the time passed by this species in its different stages:—

From deposition of egg to hatching,	- -	4 to 6 days.
" hatching to first moult,	- -	17 "
" first to second moult,	- - -	3 "
" second moult to spinning cocoon,	-	5 "
" spinning cocoon to imago,	- -	12 to 14 "

ENTOMOLOGY FOR BEGINNERS.

THE RED-HUMPED APPLE TREE CATERPILLAR.
(Notodonta concinna)

BY THE EDITOR.

This insect appears in the perfect or moth state (fig. 9) during the latter part of June. When its wings are expanded it measures from one inch to one inch and a quarter across. The fore wings are dark brown

* Bulletin No. 3; U. S. Ent. Commission, p. 27.

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on the inner margin and grayish on the outer margin with a dot near the middle, a spot near each angle and several longitudinal streaks along the hind margin dark brown. The hind wings of the male are brownish or dirty white, those of the female dusky brown; the body is light brown, the thorax of a darker shade.

Fig. 9.

The female deposits her eggs in a cluster on the under side of a leaf during the month of July, where they shortly hatch into tiny caterpillars, which at first consume only the substance of the under side of the leaf, leaving the upper surface unbroken, but as they increase in size they devour the entire leaf. When not eating they lie closely together on the twigs and sometimes entirely cover the branches they rest on; they attain their full growth during August or early in September. When mature the larva presents the appearance shown in fig. 10. The head is coral red and there is a lump on the back on the fourth segment of the same color; the body is traced lengthwise by lines of black, yellow and white, and has two rows of black spines along the back, and other shorter ones upon the sides from each of which there arises a fine hair. The hinder segments taper a little and are always elevated, as shown in the figure, when the insect is not crawling. It measures when full grown about one and a quarter inches long.

Fig. 10.

They entirely consume the leaves of the branch on which they are placed, and when these furnish insufficient food to bring them to maturity, the adjoining branches are laid under tribute. When handled they discharge from their bodies a transparent fluid of a strong acid smell, which doubtless serves as a defence from their enemies, especially birds, since their habit of feeding openly in large flocks renders them particularly liable to attack from these active foes.

Fig. 11.

When full grown they all disappear about the same time, descending from the trees to the ground, where they conceal themselves under leaves upon or slightly under the earth. Here, after a long time, the larva changes to a brown chrysalis, fig. 11, and remains in this condition until late in June or early in July of the following season. They are very

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generally distributed, but seldom abundant, and while very partial to the leaves of the apple tree, feed also on those of the plum, pear, cherry, rose and thorn.

As they feed in flocks during their entire existence, these larvæ can easily be gathered and destroyed either by cutting off the limbs on which they are feeding and burning them, or by dislodging them by suddenly jarring the limbs, when the larvæ fall to the ground and may be trampled under foot.

PTEROPHORIDÆ.

BY CHARLES FISH, OLD TOWN, MAINE.

(Continued from Page 74.)

ŒDEMATOPHORUS LUGUBRIS, n. s.

Front of head and palpi very dark fuliginous, the vertex slightly lighter. Form of palpi as in *O. Baroni.* Antennæ dotted above with white and blackish scales, tawny brown beneath. Thorax color of vertex. Abdomen slender, with scales slightly raised at extremities of joints, dark fuliginous brown, rather copiously sprinkled with black scales. Legs dark brown gray, the middle tibiæ whitish just before the middle and end bands, and all the tarsi whitish at base of joints; spurs also whitish at base. Fore wings dark smoky gray, with a dusting of black scales; inner margin and second lobe with a tinge of brown. An obscure blackish spot before base of fissure bordered posteriorly by gray scales. A longitudinal black spot on costa opposite base of fissure, embracing the costal cilia, and obscurely connected with the spot before base of fissure. Faint indications of two smaller black spots on costal margin of anterior lobe. Cilia brownish fuliginous, with a few white hairs on inner margin of anterior lobe near apex; also some of the cilia of inner margin of posterior lobe tipped with white. Hind wings and cilia, as well as under side of wings, cinereous.

Alar expanse 27-29 mil. California, Hy. Edwards, O. T. Baron.

This species is allied to *O. grisescens* Wlsm., but differs in the more slender body, and the almost entire absence of white in the markings, thus giving the entire insect a very sombre appearance. The hind tibiae

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and tarsi are much darker, the latter being lightened only at the base of the joints, while in *grisescens* they are whitish, and darkened only at end of joints; still it may ultimately be found to be only a strongly marked variety of Walsingham's species.

LIOPTILUS GRANDIS, n. s.

Head, thorax, palpi, antennae, abdomen and both pairs of wings, including their cilia, of nearly a uniform pale cinnamon color. Legs of about the same color as the wings, with tarsi somewhat lighter. Fore wings less than one-third cleft, with the anterior lobe extending into a falcated point which reaches over the shorter and broader posterior lobe. No markings except faint dots of a darker brown in some examples at the extremities of the veins on the posterior lobe. Under side of wings same as above. The largest *Lioptilus* at present known. Alar expanse 34 mil. California, Hy. Edwards, J. Behrens, Dr. J. S. Bailey.

LIOPTILUS KELLICOTTII, n. s.

Head ochreous brown, whitish between antennae. Palpi rather long and slender, second joint with a small tuft of raised scales at the extremity on upper side, third joint bending downward, ochreous brown. Antennae whitish above, pale brownish beneath. Thorax and abdomen pale brownish ochreous, the latter striped longitudinally with pale brown lines. Anterior and middle legs pale brown exteriorly, pale brownish ochreous interiorly. Posterior legs whitish ochreous, tarsi nearly white.

Fore wings pale brownish ochreous, some examples dusted more or less with dark brown scales in the median space. A dark brown dot exactly at base of fissure, two on costa and one on inner margin of first lobe near the apex; usually four at end of second lobe tipping veins 2, 3, 4 and 5. None of these dots extend into the cilia. Cilia of fore wings concolorous. Hind wings and cilia, also under side of both pairs, cinereous brown with a silky lustre. Alar expanse 28-30 mil. Buffalo, N.Y. Bred by D. S. Kellicott, from larvae infesting the stems of some species of *Solidago*. A full account of the larval habits can be found in an article by Prof. Kellicott in CAN. ENT., vol. xii., No. 6. I will state in passing that the other plume moth mentioned in the same article, the larvae of which feed upon the foliage of the same plants, is *Aciptilus montanus* Wlsm.

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ACIPTILUS BELFRAGEI, n. s.

Front of head ochreous brown, vertex pale brownish gray. Palpi brown above, whitish underneath. Antennae pale brown. Thorax pale brownish gray, tegulae whitish. Abdomen pale brownish ochreous, striped longitudinally with fine white lines, and copiously marked with short blackish streaks. Anterior and middle femora and tibiae striped longitudinally with whitish and dark brown lines, tarsi cream color with brown shading on one side. Posterior tibiae and tarsi cream color; spurs cream color tipped with brown.

Fore wings cleft about two-fifths, brownish gray, dusted with dark brown scales. There is an oblique brown patch at base of fissure, bordered posteriorly with white; a small brown spot midway between the last and base of wing, two longitudinal brown marks on the costa of first lobe and one or two brown dots on inner margin of the same lobe near the apex. Cilia of the fissure pale brown, at apex of second lobe whitish, on inner margin pale brown. Hind wings brownish cinereous with pale brown cilia. Under side of wings brownish cinereous, at the extremities of the lobes gray from admixture of white scales. Alar expanse 18 mil.

Described from one ♀ taken at Clifton, Texas, May 16, 1879, by G. W. Belfrage, to whom the species is respectfully dedicated.

TRICHOPTILUS OCHRODACTYLUS, n. s.

Head and palpi pale ochreous. Palpi cylindrical, extending horizontally beyond the head by about half its length, second joint somewhat thickened all around by raised scales, third joint rather stout, longer than the second joint, pointed. Antennae with a longitudinal brown line above, bordered by a fine white line on each side, beneath pale ochreous. Anterior part of thorax concolorous with head, posterior portion and abdomen light cream color, the latter nearly pure white beneath. Legs white, striped longitudinally with pale brownish ochreous; posterior tibiae with a band of raised ochreous scales before each pair of spurs; spurs brown on one side, white on the other.

Fore wings very narrow, cleft rather more than half, the anterior lobe tapering to a very fine point, posterior lobe linear, almost thread-like. Color pale ochreous, approaching to cream color, with a very slight brownish tinge on anterior lobe. A minute brown spot at base of anterior lobe reaches from base of fissure half-way to costa. Costal cilia of anterior lobe brownish ochreous, with a longitudinal white spot at the

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basal third, another at the basal two-thirds, and a smaller one just before the apex. Cilia of fissure ochreous with a tinge of brown just beyond the middle and some white hairs near the apices. Cilia of inner margin pale ochreous, with a white patch at about the middle of posterior lobe, beyond rather dark brownish with a streaklet of white just before the apex. Hind wings brown, cilia slightly paler; third lobe on basal half pale brownish ochreous. On the inner margin of third lobe just behind the middle is a small patch of dark brown scales in the cilia, and from this to base of wing extends a row of slender club-shaped white scales. Under side of wings brownish ochreous. Alar expanse, 17 mil. Texas, G. W. Belfrage. Described from one example taken May 22, 1879.

NOTES ON A PARASITE OF PYRAMEIS CARDUI.

BY CAROLINE E. HEUSTIS, CARLETON, ST. JOHNS, N. B.

I send you a few specimens of an insect which I have found parasitic on the larvæ of *P. cardui.* For several successive summers I have reared a number of these caterpillars, with which our thistles in most seasons abound. I observed variations in size and color of the larvæ found feeding on the same plant, which led me to suppose that they might not belong to the same species. I have always observed that a large proportion were almost black, and much smaller than those from which I had obtained good specimens of *cardui*, but until the last summer my efforts to raise these were not attended with success, all the small black larvæ dying before they had attained their full growth, although they fed well for a time.

Last season I collected from a group of thistles of the same species fifteen caterpillars, and put them in breeding boxes. They all ate voraciously and one after another went into chrysalis, except two, which died on the bottom of the box, after having made several ineffectual efforts to suspend. Those which died were black. I carefully marked those which I supposed other than *cardui* as they suspended, and watched for the advent of the butterflies. I observed that the chrysalids of the black specimens were bright golden, and smaller than those of the bright and healthy-looking larvæ. The chrysalids of the latter were grey, ornamented with white stripes along the sides.

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In due time two butterflies appeared from the striped chrysalids, and simultaneously with them a large ichneumon fly with bright blue wings and saffron body.* I felt some surprise at finding it in the box, and did not at first suspect where it came from; but when others appeared I examined the chrysalids and found several tenantless. Eight of the fifteen were infested. These flies are very sluggish, clinging closely to the sides of the box, and making no effort to fly unless disturbed.

LARVÆ OF CERURA OCCIDENTALIS LINT., AND C. BOREALIS, BD.

BY G. H. FRENCH, CARBONDALE, ILL.

During the past season I have had an opportunity of raising the larvæ of these two interesting species of insects, and as I do not know of any easily accessible description of either in the larval state, I give below the descriptions from my note book for the benefit of the readers of the ENTOMOLOGIST.

Cerura occidentalis.—Length when full grown 1.25 to the bifurcation of the anal segment. It is of nearly uniform size, a trifle enlarged anteriorly. In about the middle of the subdorsum of joint 1 is a prominent projection on each side, the body sloping from these down to the rather small head. There is but little sloping from these back to joint 9; from this there is a rapid sloping to the anal segment, this ending in two projections extensible at pleasure, instead of anal legs. When withdrawn these are a little more than a quarter of an inch, but may be extended to three-quarters. These are usually carried elevated backwards, but when extended are often thrown over the back as though used for defence. The general color is clear bright green, the sides spotted with clear purple brown, the spots round the stigmata and at the base of the legs and prolegs the largest. The back is marked with lilac, varying in shade and arranged as follows: From the two small contiguous tubercles on the back of joint 2 to the head is a somewhat diamond shaped space, the

* This insect has been kindly determined by E. T. Cresson, of Philadelphia, as *Ichneumon rufiventris.*—ED. C. E.

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broadest part at the subdorsal tubercles on joint 1. From the tubercles on joint 1 to those on joint 2 the lilac is bordered by bright brownish purple with a white line outside of this. In the middle of this diamond is a little green shading. From the tubercles on joint 2 to the extremity of the body is another parti-colored space lighter than the anterior one. This gradually expands so as to include the stigmata on joint 7, then decreases in width to the anterior part of the anal segment, expanding a little in the middle of this, but contracting again at its posterior part. The lilac of this is like the first, considerably suffused with green on the back, and is bordered with brownish purple and white, though the colors are a little lighter posteriorly. These two dorsal patches are not continuous, but are separated on joint 2 by a distinct though small patch of green. The posterior projections are mostly brownish purple, though with somewhat greenish annulations, and when extended a ring of white near the extremity. Head dark lilac. The body is a little thicker vertically than from side to side.

These were found feeding on willows (*Salix nigra*, I think) from September 9th of last year to October 5th, nearly full grown. I noticed that previous to the last moult the tubercles on joint 1 were covered with little spines.

They were kept in a room of moderate temperature during the winter and transferred to the wood-house as soon as no more freezing was apprehended. The imagines began to appear April 30th, and the last emerged June 3rd.

Cerura borealis.—Of the same size, shape and general marking as the preceding. The head is brown. The sides of the body are yellowish green, the dorsal dark color not being so distinctly separated on joint 2 as in the first. The back, instead of being parti colored, is brown, somewhat suffused with green on the back at the widest places and darker along the edges. Previous to the last moult the sides are bright green and the brown a little less dull.

Two of these were found feeding on wild cherry the 17th and 18th of September, one nearly full grown which spun up Sept. 23rd. Only one produced an imago, and that emerged April 21st.

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LIST OF N. AMERICAN SARCOPHAGIDÆ, EXAMINED BY R. H. MEADE, ESQ., BRADFORD, ENGLAND.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The Deyrolle carton containing the specimens, which are in the same position as returned by Mr. Meade, bears the inscription by the Baron von Osten-Sacken: "This collection was arranged at my request by Mr. R. H. Meade, especially with a view of ascertaining whether any of the species are common to Europe and N. America." I have published this list for the same reason as the Anthomyidae. The division of the species is so far advanced that not much is left for the future monographer, except to draw up the descriptions and to name the species. Both are not done by myself for obvious reasons. The 27 species with 115 specimens are indeed all the contents of the collection of the Museum and those of the Baron. The Loew's collection contains about 24 species not labeled (except for the 3 species given) nor even arranged after the species. About half of them are from Cuba. My additions are given in [ ]; I have tried to compare the species as carefully as possible, but I should remark that the types of only 12 European species are at hand. Of the species are from N. England 13, from N. York 14, from Canada 7, from the Antilles 5.

SARCOPHAGA.

A. Anus red or yellow. (First division.)

B. No spines upon the second longitudinal veins.

C. Posterior tibiae of male bearded on their inner sides.

D. Second abdominal segment without central spines.

E. Thorax with four dorsal bristles behind suture.

Spec. 1. *S. aegra?* Walk.; does not correspond to any British species.

[8 specim. M., male and female, Cambridge, Mass., June 22; Catskill Mts., N. Y., July, 1874, O.S.; Denison, Craford Co., Iowa; Brit. Amer. In Loew's coll., 4 male and female, Ill.; Minn.; Wisc. Two types from Mo., labeled by O. S. *Sarcophaga sarraceniae* Riley, which have not been seen by Mr. Meade, are identical; the species was formerly believed to be *S. carnaria* Comstock's Rep. 1879, p. 304.]

E. Thorax with three dorsal bristles behind suture.

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Spec. 2. Not like any British *Sarcophaga.*

[10 spec M., male and female, Cambridge and Dorchester, Mass.; Trenton Falls, July, O.S.; Long Island, O.S., July, Sept.; Manlius, Comstock, all N. York; Canada; Illinois. There are similar specimens in L. coll., but I am not sure of the identity.]

E. Thorax with only two large bristles behind suture.

Spec. 3. Seems identical with *S. nurus* Rond.

[11 spec. M., male and female, Cambridge, Mass.; N. York; Pennsylvania; Canada; Twin Lake, Color., Lieut. Carpenter. In Loew's coll. is at least one specimen labeled *S. dimidiata* from N. Y., bearing the same No., 325, with two seen by Mr. Meade. The number was used by O. S. to identify later specimens sent by him to Loew. One specimen seen by Mr. Meade from Mr. A. Agassiz' collection is labeled *S. georgiana*, and probably to be considered as the species mentioned by Th. W. Harris, as most of Mr. A.'s specimens were determined by him. I can not compare *S. nurus* Rond.]

Spec. 4. Very similar to *S. crustata* Meig.

[2 spec. M., male and female. Nahant, Mass. I cannot identify with them spec. in L. coll.]

Spec. 5. Similar to *S. nurus* Rond., only both anal segments red.

[3 spec., Cambridge, male; Cuba, Ch. Wright, female. In Loew's collect. 3, Distr. Columbia, a number from Cuba marked "viviparous, out of rotten land cray-fish," one fr. Bahia.]

Spec. 6. *S. Lherminieri?* R. Desv.

[One female, M. collect. on a voyage fr. Aspinwall to N. York by W. Holden; loc. incert.]

C. Posterior tibiae of male without beard.

D. Second abdominal segment with two central spines.

E. Thorax with four dorsal bristles behind suture.

Spec. 7. Differs from any British species.

[2 spec. M., one N. Conway, N. H., male, August 17, O. S.; the other marked "doubtful spec.," female, S. Franc., Cala., Holden. I am not able to see the two spines in the centre of the edge of the 2nd segment.]

E. Thorax with three dorsal bristles behind suture.

Spec. 8. Corresponds with *S. erythrura* Mgn.

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[2 spec., male and female, M., Cambridge, Mass.; Cayuga Lake, N. Y., Comstock, June 19.]

D. 3. Second abdominal segment without central spines.

E. Thorax with four bristles behind suture.

Spec. 9. Differs from any British species.

[25 spec. M., male and female. Cambridge, Mass.; Long Isl., N. Y., O S., Manlius, N. Y., Aug. 26, Sept. 28, Comstock, swept from grass, in woods; Fabyan's Nock., N. H., Sept., O. S.; Illinois, Allen; Brit. Amer, Scudd.; Huds. Bay Terr., Kennicott; Pacific Slope, Color., Lieut. Carpenter. In Loew's coll. fr. Illinois, Nebraska.]

Spec. 10. Not like any British species.

[2 spec. M., male and female, Long Island, N. Y.; O.S.]

E. Thorax with three bristles behind suture.

Spec. 11. Differs from all European species.

[7 spec. M., male and female, Cambridge, Mass.; Long Island, Cayuga Lake, May 25; Manlius Sept. 6, all N. Y.]

Spec. 12. Not like any British species.

[3 spec. M., male and female, Manlius, N. Y.; Maryland, Oct. 20; Grand Anse, Hayti, Uhler.]

Spec. 13. Very similar in structure to *S. haematodes* Meig.

[2 spec. M., female, Kentucky.]

E. Thorax with only two large bristles behind suture.

Spec. 14. Not like any British species.

[5 spec. male and female, Dorchester, Mass; Englewood, N. J.; South Park, Colorado; Grand Anse, Hayti.]

Spec. 15. Not like any British species.

[2 spec. M., male, Cuba; Distr. Columbia.]

B. Both second and fourth longitudinal veins of wings with spines.

D. Second abdominal segment without spines.

E. Thorax with four dorsal bristles behind suture.

Spec. 16. Differs from any British species.

[7 spec. M., male and female. Canada; Mass.; Long Island and Manlius, N. Y., end of August.]

E. Thorax with three dorsal bristles behind suture.

Spec. 17. Differs from any British species.

[9 spec. male and female. Cambridge, Mass.; Long Island, N. Y., O. S.; Grand Anse, Hayti, Uhler. The four larger specimens from

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Cambridge and New York are *S. pachyprocta* Loew, var. *major;* the other ones from New York and Hayti are *S. pachyprocta* Loew, var. *minor*. The labels in Loew's handwriting are on the pins, and two corresponding specimens with the same numbers and labels in Loew's collection; there are specimens from Cuba and Pennsylvania in L. coll.]

Spec. 18. Not like any British species.

[1 spec. M.; Manlius, N. Y., Aug. 18, Comstock.]

A. Anus black or gray. (Second division.)

B. Second longitudinal veins of wings spineless.

C. Posterior tibiæ of male bearded.

E. Thorax with four dorsal bristles behind suture.

D. Second abdominal segment without central spines.

Spec. 19. Closely resembles *S. similis* Mihi.

[3 spec. M. male and female, Lake Superior, Agassiz; South Park, Color., Lieut. Carpenter. See about this species O. S. Catalogue, p. 257: "I am doubtful whether any of the N. Am. species is absolutely identical with *S. carnaria*, unless it be with *S. similis*, etc." Mr. Meade.

E. Thorax with three bristles behind suture.

Spec. 20. Very similar to female of *S. albiceps* or *S. atropos.*

[1 spec. M., Detroit, Mich., June 3, Hubbard.]

C. Posterior tibiæ of male smooth.

D. Second abdominal segment with two central spines.

Spec. 21. Corresponds closely with *S. juvenis* Rond.

[2 spec., male and female, M.; Manlius, N.Y., Aug. 12, Comstock; Detroit, Mich., July, Hubbard.]

Spec. 22. Corresponds closely with *S. nigriventris* Meig.

[1 spec. M., Sturgeon Isl.; Brit. Amer.; N. Red River; Scudder.]

Spec. 23. Not like any British species.

[1 spec., Cambridge, Mass.]

Genus *Phrissopoda* (Peskia Desv., Meade.)

Spec. 24. *imperialis?* Desv.

[1 spec. M., Cuba; some spec. in L. coll.]

Gen. *Cynomyia* Desv.

Spec. 25. Spec. uncertain.

[1 spec. M., Fabyan House, N. Hampsh. O.S.]

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Gen. *Theria* Desv.

Spec. 26, 27; can not name the two species.

[6 spec.; all N. York, Manlius, Aug. 21-27, Sept. 6; Cayuga Lake, June 19; Comstock.]

Family Tachinidae.

Sectio. Phasina.

Gen. *Xysta* Meig.

Spec. 28. One female spec., N. Hampsh.

[This specimen is different from the type of *X. didyma* Loew. The type described was a male from Illinois; the only male in L. coll. with label on the pin has a white square label with an R., similar to those with green square label from Red River of the North. Besides stands a female from Texas, less than half as large; perhaps not belonging here.]

Family Dexidae.

Gen. *Prosena.*

Spec. 29. One spec. from Cuba. [Differs from Loew's type, *P. mexicana.*]

Genus *Miltogramma* Meig.

Spec. 30. [There are 5 spec. from Cambridge and Dorchester, Mass.; Trenton Falls, N. Y.; Colorado Mts., Carpenter; probably belonging to different species.]

Spec. 31. [*Sarcophaga nudipennis* Loew.; bred from mud cells of *Pelopaeus* by W. H. Patton, Waterbury, Conn., Aug. 24; see Packard's Guide p. 408. One of the spec. by Mr. Meade labeled *Miltogramma* Meig., the other one *Miltogramma?* Meig. There are in Loew's two spec. with corresponding number, and label in his handwriting.

ON SIMULIUM.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

I have received from Mr. H. G. Hubbard some larvæ and pupæ, with the case, labeled as follows: "The *Simulium* larvæ and pupæ were collected on the rocks at the foot of the falls of Michipicotin River, Lake Superior, in shallow pools and gutters of rapid water. There were large patches of rock surface densely covered with either the larvæ or pupæ, so

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closely packed as to resemble a growth of aquatic vegetation. The black flies were very abundant in the woods."

The pouch or case is similar to that described by me for *S. pictipes*. The nymphae and larvae seem to be the same, but that the pupa has on each side nine filaments instead of eight, as stated for *S. pictipes*. I made a new examination of my material and found this number variable, without possibility to ascertain that one filament is broken off. I see nymphae with eight or with nine filaments on both sides, and have ascertained in one specimen nine on one side and eight on the other. I think more material is needed to decide if one filament in such cases is perhaps wanting as a consequence of a previous mutilation. The flies sent by Mr. Hubbard, without certainty to belong to the pupae, are only half the size of *S. pictipes*, and differ in the color of the legs. But the few specimens of *S. pictipes* which I have seen are newly hatched and in alcohol. The flies sent by Mr. Hubbard are considerably smaller than those described by Mr. Barnard, and differ also by the color of the legs. (Amer. Entom. iii., No. 12.)

To prevent later uncertainty about the types of *Simulium* in the collections of the Museum, I have to state that the collection of O. Sacken contains named only *S. vittatum*, and the collection of Loew only *S. venustum* and *S. quadrivittatum*. *S. invenustum* and *piscioidium*, though starred in the catalogue of O. S., have not been found in his collection. There is without name only one specimen from Hudson's B. Terr. (none in Loew's), and no specimens from Mumford, N. Y. Only two later collected from Goat Isl., and one labeled by myself from Trenton Falls. Loew's collection has no species from N. Y. In both collections are a number of unnamed specimens, and Mr. Hubbard's species seems to agree with one from the Saskatchewan River.

LIST OF NORTH AMERICAN BOMBYCIÆ OF HUBNER.

BY A. R. GROTE.

Since I first catalogued our species of *Bombyciæ*, under Herrich-Schæffer's later designation of *Cymatophorinæ*, in the Proc. of the Entomological Society of Philadelphia for May, 1863, there have been but few additions to the group. Nor have the then debatable points been settled

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The validity of *expultrix* as a "species" is still doubtful. I have taken a considerable number of both sexes of *expultrix* and *cymatophoroides*, and while the latter show a considerable variation in the distinctness of the finer markings of the fore wings and in the depth of ground color, the specimens of the former remain always nearly alike and uniform, and never show the black lines of the typical *cymatophoroides*. Notwithstanding I am inclined to revert to my original opinion that the two are but forms of one species. Since 1863 the typical genus of the group has been discovered in this country. Both the described species of *Bombycia* are from the Pacific Coast, and are additional examples of the resemblance of our Western fauna with that of Europe. Of one, *semicircularis*, I have seen only the female; in the smooth abdomen with its single dorsal tuft and the basal patch on primaries it resembles *Thyatira*. In ornamentation and cut of wings it is like *improvisa* and the European species.

In the present list I leave the genera as formerly recognised, but I am aware that they need more careful study. This cannot be undertaken until fuller material from the Pacific is received. Mr. Hy. Edwards reports *expultrix* from British Columbia; if this locality is correct we have a wide range for this species. I suspect that under the name *derasa*, the same author reports *scripta* from Alaska and Victoria. The members of this group seem single brooded, and in New York I have taken *scripta* and the two forms of *Pseudothyatira* in May and June at sugar. The larvæ await discovery and description.

LEPTINA *Gueneé.*

dormitans *Guen.*, R. I.; N. Y.

ophthalmica *Guen.*, Wisc.; N. Y.; Mass.

Var. australis. Texas; Alabama.

This form is narrower winged and the markings are more effaced than the type. The black curved mark inaugurating the s. t. line in the type is here straighter, shorter, in one specimen thicker. The black marks at internal margin of the same line are disconnected dashes; the line itself is interrupted. The basal patch is whitish. This is not improbably a distinct form, but the variations of the species of *Leptina* are not understood.

latebricola *Grote.* Wisc.; N. J.

N. B.—I have only seen one more specimen than my type, which latter is in Coll. Ent. Soc. Phil., and which I have not been able to compare since describing it.

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Doubledayi *Guen.*, Mass. (in July); N. Y.; Penn.

BOMBYCIA Hubn.

improvisa *Hy. Edw.* Wash. Territory.
semicircularis *Grote.* Wash. Territory.

N. B.—Mr. Walker describes a "*Cymatophora caniplaga*" from Canada; I do not know it and the type must be examined to see if it belongs here.

THYATIRA Ochs.

lorata *Grote.* Wash. Territory.
pudens *Guen.* Anticosti; Can. to Penn.

PSEUDOTHYATIRA Grote.

cymatophoroides *Guen.* Can. to Penn.
expultrix *Grote.* Same localities, also B. Col. (teste Hy. Edw.)

HABROSYNE Hubn.

scripta *Gosse; abrasa* Guen., Alaska?; Victoria? *(derasa* Hy. Edw.) Canada to Pennsylvania.

N. B.—This species is very near the European *derasa*, but is considered distinct from a comparison of the imago by Gosse and Gueneé. I have given the differences as they appear to me (Proc. Ent. Soc. Phil., 2, 58). It seems to me better where differences occur to keep distinct names for these "representative species" or "geographical varieties." They are connected with the series of distinct species by forms differing more or less notably, and in this case it is difficult to decide where the "species" commences and the "variety" ends. But it is quite unexact to lump species in the moths as has lately been attempted in the pages of the Brooklyn Ent. Society's periodical, without exact information and merely on the general principle that there are too many "species" in our lists. This may indeed be the case, but the way to prove it does not lie in slurring over noted characters or quoting opinions which do not rest on solid foundation. More confusion is created by throwing together distinct forms under one name than in keeping varieties under specific titles.

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MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Entomological Club of the American Association for the Advancement of Science was formed last year into the Entomological Sub-Section of Section B of the A. A. A. S., and will therefore hold no separate meetings hereafter. It will meet with the Association at Cincinnati, Ohio, on Wednesday, 17th August, 1881, at 10 a. m. All persons interested are invited to attend its meetings and participate in its discussions.

B. PICKMAN MANN, Secretary. JNO. G. MORRIS, President.

ON THE APHIDIDÆ OF FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

(Paper No. 1.)

BY WM. H. ASHMEAD, JACKSONVILLE, FLA.

In the April number of the CANADIAN ENTOMOLOGIST I described a new Aphis affecting *Pinus australis* belonging to the Section *Lachnini.*

Having been studying the Aphididae of Florida for the past two years, a quantity of new material has accumulated on my hands, representing nearly all the known North American genera.

This I now propose bringing to the notice of the Entomological world, at the same time giving a list of all the known North American species in a series of short papers, through the columns of the CAN. ENT.

I desire to express my thanks to my friend, Mr. Allen H. Curtiss, of this city, and to Dr. A. W. Chapman, of Apalachicola, for assistance in determining the plants upon which these feed. In classification I shall follow Prof. Cyrus Thomas.

Section LACHNINI.

Genus *Lachnus*, Illiger.

The species of this genus already described from North America are as follows :

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1. L. salicicola, Uhler.
   Syn. Aphis salicti, Harris.
2. L. dentatus, LeBaron.
3. L. caryae, Harris.
4. L. strobi, Fitch.
5. L. laricifex, Fitch.
6. L. abietis, Fitch.
7. L. alnifoliae, Fitch.
8. L. quercifoliae, Fitch.
9. L. salicelis, Fitch.
10. L. longistigma, Monell.
11. L. australi, Ashmead.

To these I add the following :

12. LACHNUS QUERCICOLENS, n. sp.

Wingless female.—Length .05 inch. Ovate. Reddish, becoming brown with age. Vertex of head brown; beak reaching to middle coxae, reddish at base, yellowish in middle and brown at tip; antennae 7-jointed, reaching to honey tubes, whitish, basal joint reddish, joints annulated at tip with black, apical joint short, black; honey tubes almost obsolete, as wide as long, whitish; style hardly visible, whitish, pubescent; legs pubescent, posterior pair dark brown or black, middle and anterior pair reddish yellow, feet infuscated.

Winged individual.—Length .05 inch. Same as apterous female excepting abdomen is lighter in color, middle femora and coxae dark brown, and wings hyaline, with the stigma and veins green.

This species was found early in February, feeding on the under surface of the leaves of the live oak, *Quercus virens*. Winged specimens, however, were not taken until April.

Genus *Phyllaphis*, Koch.

The only species so far known belonging to this genus is

1. Phyllaphis fagi, Linn.

To this I now add

2. PHYLLAPHIS NIGER, n. sp.

Wingless female.—Length .05 inch. Ovate and of a shining black color. Head broad, nearly as long as wide, slightly arcuate in front and with two longitudinal depressions on vertex.

Beak long, reaching beyond hind coxæ, black at base, but becoming reddish towards tip and slightly pubescent; antennae 7-jointed, situated very widely apart and not on tubercles, brownish in color with the terminal joint very minute; metathorax a broad, smooth, shining, convex plate; abdomen wider than long, sides flattened to honey tubes, slightly pubescent; honey tubes black, almost obsolete, as wide as long; style not visible, anus pubescent; legs dark brown, approaching black, pubescent, posterior pair long.

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This, in some respects anomalous Aphis, was detected feeding on a tender shoot of the willow oak, *Quercus phellos*, variety *laurifoliæ*. No winged specimens could be found.

The broad head, slightly pubescent abdomen and other characters would seem to exclude it from the genus *Lachnus*. I have therefore placed it provisionally in *Phyllaphis* genus, to which it seems most closely allied.

DESCRIPTION OF A NEW SPECIES OF TROCHILIUM.

BY HERMAN STRECKER.

TROCHILIUM GRANDE, n. sp.—General appearance of *T. Ceto* (*Melittia Cucurbitæ* Harr.) but very much larger, expanding 1¾ inches.

Antennæ blackish. Palpi reddish orange. Head white in front, dark lustrous greenish gray on top. Collar red. Thorax above dark greenish same as top of head. Abdomen red, each segment outwardly edged with black. Beneath whole body reddish orange; on the abdomen a row of black ventral spots. Posterior legs heavily clothed with red hair, accompanied by a narrow ridge of black, above, towards the abdomen; tibial spurs black edged with white hair inwardly. Fore and middle legs red, tarsi black and white ringed.

Primaries. Upper surface same dark silky gray as back of thorax. Secondaries transparent, broadly fringed on exterior edge with same color as primaries; some orange hairs at abdominal margin and base of wing.

Under surface. Primaries shining orange red shading somewhat into gray towards exterior margin. Fringe gray. Secondaries as on upper surface, but with some red scales along costa.

Hab. Texas.

Allied to *Desmopoda Bombiformis*, Feld., *Trochilium Astarte*, Westw., but still more closely to our smaller indigenous species *T. Ceto*, above alluded to, and to a species from Mexico lately described by Hy. Edwards as *Melittia Gloriosa;* this latter differs from all those mentioned in having opaque hind wings.

As the description of Hübner's genus Melittia, in which the Americans place *Ceto*, is much too vague and uncertain ("The fore wings partly, the hind wings entirely transparent; the feet very thickly haired.") I have preferred to adopt Prof. Westwood's infinitely better determined genus *Trochilium*.

May 4th, 1881.

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The Canadian Entomologist.

VOL. XIII. LONDON, ONT., AUGUST, 1881. No. 8

NOTES ON AEGERIA PINI.

BY D. S. KELLICOTT, BUFFALO, N. Y.

The description of this moth on page 7 of this volume was drawn from a single female specimen and that not in good condition. I have this season secured fresh examples of both sexes; from these I note some additions and corrections to the previous account.

The male is smaller than the female but of similar ornamentation. The antennæ are fimbricate; the hoary hairs towards the base are nearly equal in length to the diameter of the joint on which they stand. The fourth abdominal ring bears an orange band on the posterior half in the female; it occupies nearly the entire width of the ring in the male. The black of the upper side of the abdomen is continued in the tail fringe. As regards the color of the head, the vertex in one female was black, in one black with a few orange hairs, in another the orange equals the black; it is orange in all the males seen; the under side of first joint of palpi is orange. There are a few orange scales on the coxæ of the first pair, and an oblique tuft of same color on inner side of fore tibiæ; these marks occur in both sexes. In some examples there are a few orange scales or hairs on top of thorax, especially on the inner edge of shoulder covers.

It seems worthy of note that the specimens hatching in confinement, and so not having used their wings in flight, have the hind wings sparsely covered with scales, as in the case of the newly hatched *sesia*. These scales fall off easily, but appear to be retained more firmly than in the former cases with which I am acquainted. An apparently full grown larva brought in July 15, 1880, gave a pupa May 19 and an imago July 2, from which I conclude that the larva does not transform until two years old. The moths appeared ten days later in 1880 than in 1881.

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DESCRIPTION OF PREPARATORY STAGES OF HELICONIA CHARITONIA, LINN.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—Cylindrical, one half higher than broad, flat at base, tapering very slightly from base to about three fourths the length, then conoidal, the top flattened and a little depressed; marked by 14 vertical ridges, straight, narrow, not very prominent, and extending from base to the middle of the cone; below the cone are horizontal striæ, which with the ridges enclose long, rectangular spaces; there are nine tiers of these, each space roundly excavated; above the base of the cone are similar spaces in one tier, but they are higher and more nearly square and more deeply excavated; next these is a tier of seven cells, irregularly pentagonal; the flattened top is composed of three concentric rows of small spaces, the outer one largest, and this and the next formed of pentagons; the inner row is made of rhomboids with the micropyle in the centre; color yellow. Duration of this stage 3 days.

YOUNG LARVA—Length .08 inch; cylindrical, segments 2 to 7 of about even thickness, then tapering, the dorsum sloping; marked by six rows of rounded tubercles, each of which sends out a long black hair, those on three anterior segments bent forwards, the others back; there is also a minute tubercle at the junctions of the segments a little below the subdorsal row, with short hairs; color pale red-brown; legs and feet same; head obovoid, a little lighter in hue than the body; sparsely pilose. To 1st moult 2 to 3 days.

After 1st Moult—Length .22 inch; cylindrical, nearly even, the segments a little rounded; color light brown, changing, as the stage proceeds, to greenish-white, mottled with brown; armed with six rows of spines, two sub-dorsal, one on middle of each side, and one infra-stigmatal; these spines are short, slender, tapering, black, with a few short black bristles on the sides standing almost at right angles to the spine; on 2 a chitinous dorsal patch with hairs; feet and legs brown; head obovoid, truncated, a little depressed at the suture, the vertices low, rounded, and on each a short, tapering blunt process, black, with a few fine bristles. To next moult 2 days.

After 2nd Moult—Length .5 inch; color dull white, mottled or

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spotted with yellow-brown; under side wholly brown; the spines long, sharp; head as before. To next moult 2 days.

After 3rd Moult.—Length .7 inch; slender, whiter than before, the color not pure but with a green tint; dorsal spines .1 inch long, upper laterals .09 inch, lower laterals .07 inch; head greenish-yellow, the processes more like the body spines, .08 inch long, directed forward and a little recurved. To next moult 3 days.

After 4th Moult—Length 1 inch, and in 3 days reached maturity.

MATURE LARVA.—Length 1.25 to 1.5 inch; cylindrical, slender, nearly of even size from 2 to 12, the segments a little rounded; color dead white, with no gloss, smooth, with no hairs; spotted with black or black-brown, the spots disposed in cross rows, two of which are back of the spines and one on the extreme anterior end of the segment; mostly rounded or oval, but those on medio-dorsal line are half-oval except the spots on the posterior edges of the segments, which are triangular; these spots form one dorsal row and two on either side; over the basal ridge, on 4 to 11, is a brown patch covering the adjacent edges of the segments; another patch covers each spiracle; under side reddish-brown with a green tint; segment 2 has a dorsal chitinous bar divided in middle, and on either part are two black tubercles with hairs; the body furnished with six rows of spines, two sub-dorsal, one on middle of each side, and one infra-stigmatal; the dorsals run from 3 to 13; the upper laterals from 5 to 13, the lower from 5 to 12; and between 2 and 3, 3 and 4, in line with upper laterals, is a spine; the spines of the four upper rows are straight and erect, but those of the lower row are turned down and a little recurved; all are alike, shining black, and about each are from 5 to 7 short black bristles irregularly placed; the dorsals measure .16 inch, the 1st laterals .14, the lower 1 inch, and there is little variation in the length of the spines of each row; legs brown, tipped black, pro-legs brown, with a black spot on the side of each; head obovoid, rounded in front, truncated, a little depressed at the suture, the vertices but little elevated, rounded; color greenish-white, vitreous; on either side the suture on mid-front a round black spot; the ocelli black on a small black patch; mandibles black; on each vertex a black spine nearly like those of the body, but less tapering and more blunt, .1 inch long, directed forward at about 45°, and a little recurved.

As the larvæ approach suspension the spots change to brown, and the

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white becomes dull and sordid. Twelve hours after suspension, pupation takes place.

CHRYSALIS—Length to top of head .95 inch, to end of processes on head 1.1 inch; slender, compressed laterally, the thoracic segments on ventral side highly arched and rounded abruptly down to abdomen; the sides of this elevation covered entirely by the wing cases, sloping, almost flat or a little convex, the two wing cases not quite meeting, but separated by a narrow depressed ridge, on either side of which is a row of small bead-like tubercles, each giving out at top a short sharp bristle or thorn; this ridge widens anteriorly so as to include the antennæ cases, and the rows of beads pass along and around head case to its top on the dorsal side, but for a little distance at the base of the antennæ lose their bristles; head case prominent, compressed transversely, nearly square at top; upon each vertex a narrow leaf-like process, lanceolate, flattened and thin, serrated on both edges, divergent, like horns; mesonotum prominent, compressed at top into a thin carina which rises on the anterior part in a double curve to a sharp point, but on the posterior side slopes at about 45°; followed by a rounded excavation considerably longer than the mesonotum itself; abdomen cylindrical; on the two upper segments a large sub-dorsal, flaring, flattened process rounded irregularly on the edge and completely spanning both segments; on the next segment is a small sharp rounded process, and on the next another small and flattened; on the next a sharp tubercle, in some cases flattened; on the tops of all these processes are thorns, one on each of the smaller, and two on the largest; in row with these, on the depression and on the sides of mesonotum are four low conical tubercles, each with a short thorn; segments 9, 10, 11, in the ventral line, have the anterior edges turned up and produced into low divergent points; at the base of the head case on dorsal side a large burnished gold spot, and the tubercles behind the mesonotum are similar to this in color; general hue brown, in shades; the anterior parts, which includes head case, mesonotum and half the wing cases, being light or yellowish; the rest of wing cases dark, or streaked dark in the interspaces of the wings; the light part of these cases somewhat gray or whitish; the processes on head and the antennæ cases are dark; abdomen varied in longitudinal streaks, confined to each segment, dark and light brown, with some oblique whitish marks on the ventral side. Duration of this stage 6 to 7 days.

This species is common in Southern Florida, and has been taken at

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least as far north as Port Royal, S. C., from which place I have seen an example. It is a tropical species, however, and abounds in Central America and the Antilles. By the kindness of Dr. Wm. Wittfeld, of Indian River, eggs were obtained by tying the females in bags over stems of Passiflora, and after several failures, owing to delays on the journey, I received 30th Aug., 1880, larvæ of different sizes. The eggs had been mailed very soon after laying, and the larvæ had hatched on the road. I gave them Passiflora coerulea. All the changes take place with great rapidity, scarcely two days being necessary for each larval stage. When mature, being porcelain-white, with their long black body and head spines, they are conspicuous objects, and very pretty ones. They move about actively, and in habit and general appearance—except color—remind one of Agraulis *Vanillae.* Dr. Wittfeld informs me that on touching the chrysalis of *Charitonia,* it wriggles about and gives out a perceptible creaking noise, but I had not observed this with my chrysalids.* The chrysalis is a most remarkable object, from its general shape and the thorny flattened projections on the abdomen, and the foliaceous processes on the head.

Several imagos came forth in my room and one of them I turned loose in the garden, placing it carefully upon a Passion flower. It rested some moments, with wings fully expanded over the flower and depressed a little below horizontal, and then flew slowly away toward the woods and I saw it no more.

Dr. Wittfeld informs me that these butterflies frequent paths in the woods, or are found feeding at a little distance from the woods, to which they at once betake themselves, if alarmed, and that with rapid wing, though usually their flight is rather heavy and measured. Also that they have the habit of gathering in flocks towards night and roost on Spanish moss, and on dry twigs of trees, especially such as have dead leaves still hanging to them. He has seen them so roosting, always with heads up, to number of 50 or 60. In the morning, after the sun is well up, they come trooping from the woods in search of flowers.

* In Part II of Dr. Weismann's Studies in the Theory of Descent, Lond. con. 1881, is an abstract of a paper by Dr. Fritz Müller, on Brazilian butterflies, in which it is stated that "the pupæ of Heliconius when moving their posterior segments rapidly, as they do whenever they are disturbed, produce a very perceptible hissing noise by the friction of these segments, this sound perhaps serving to terrify small foes."

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Mr. Thaxter has described Danais *Archippus* as flocking in this manner, in Florida, but this seems to be a habit at certain seasons, during the day as well as night. *Charitonia* would seem to roost in crowds at night only, and to disperse during the day for feeding, like so many pigeons. I find nothing of this in books, nor have I been able to find that any of the preparatory stages of this species have been figured or even described by authors. I have a complete set of drawings of the egg, larva at each stage, and chrysalis, and shall in due time give a Plate to them in Butterflies of N. A.

INSECTS OF THE NORTHERN PARTS OF BRITISH AMERICA.

COMPILED BY REV. C. J. S. BETHUNE, M. A.

From Kirby's Fauna Boreali-Americana: Insecta.

(Continued from Vol. xi., p. 154.)

FAMILY NOCTUIDÆ.

429. PLUSIA RECTANGULA *Kirby*.—Expansion of wings 1½ inch. Taken in Canada by Dr. Bigsby.

Body cinereous, underneath whiter. Antennæ testaceous; thorax crested? as the scales are mostly rubbed off this cannot however be positively asserted; wings incumbent; primaries with a subcrenate edge; inclining to ash-colored, clouded with black, with a subramose rectangular somewhat silvery spot, extending from near the base to the middle of the wing; between which and the apex is a narrow white wavy band, edged with black; and still nearer the margin a zigzag transverse black line; the secondary wings are plicatile, cinereous, and dusted at the apex with brown.

N. B. The silvery rectangular spot in the primary wings of this insect, when they are brought near to each other, forms a quadrangular area very much resembling a picture in a silver frame.

[307.] 430. PLUSIA GAMMA *Linn.*—Expansion of the wings 1½ inch. Taken in Canada by Dr. Bigsby.

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Head, crests of the thorax and abdomen gray; these crests are edged with white and in the anterior ones the margin is formed by a black and white line; abdomen cinereous; antennæ above testaceous, underneath white banded with brown; the primary wings are shaded and clouded with black, brown and white, and towards the apex have three indistinct bands, the first white internally abbreviated, the second dark-brown, and the marginal one gray including a transverse series of black crescents; in the disk of the wing is a pallid silvery signature, representing the Greek letter gamma, or the Roman Y, the forked part pointing to the costal margin; from the upper point of the fork a white curving line runs obliquely to the anal margin of the wing near its base; secondary wings light brown, or drab, with the nervures, and posterior margin broadly, dark-brown; fringe alternately dark and light; underneath the wings are cinereous, darker at the apex.

[308.] 431. PLUSIA FALCIFERA *Kirby*.—Expansion of the wings 1½ inch. Taken in Nova Scotia by Dr. Mac Culloch.

Body gray. Antennæ and thorax, when laid bare, testaceous; primary wings gray with a faint reddish tint, a broad brown spot, or cloud, almost triangular, traverses the middle of the wing, which partly includes, and is partly edged, by a sickle-shaped silvery streak; the part representing the handle of the sickle being broader than the rest, and sending forth externally near its apex a short branch, which, with the internal apex of the handle, forms a fork; the inner tine, or branch, of which terminates in a slender line running in a curve to the costal margin, where it touches the scutellum; a brown indistinct cloud, or band, also runs obliquely from the anal to the apical angle of the wing; a very minute, pale streak marks it just transversely above the former angle; the posterior margin is slightly indented; the secondary wings are reddish-brown, with an obsolete, pale, submarginal band.

432. PLUSIA IOTA *Linn.*—Expansion of wings 1¾ inch. Taken in Nova Scotia by Dr. Mac Culloch and in Canada by Dr. Bigsby.

[309.] Body, legs and antennæ fawn-colored, as are likewise the paler parts of the wings; primaries clouded and streaked with dark, and reddish-brown; the disk of these wings is occupied by a large cloud of this color inscribed with two, sometimes silvery, and sometimes golden, brilliant metallic spots, tending to form an obtuse angle with each other; the upper one, or that nearest the base of the wing being acuminated towards that

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part, rounded towards the apex, and sending forth two branches towards the costal area; the lower spot is subtriangular or V-shaped, with the point towards the base of the wings; the two together form, in some sort, a semicolon reversed; between the lower or ovate spot and the costa is a rather indistinct circlet of gold or silver, and two streaks of the same lustre may be traced lower down between it and the inner margin of the wing; the disk near the apex is bronzed; from the brown cloud mentioned above runs a wavy brown streak to the external apical angle, the apex itself is terminated by a band formed by indistinct black crescents; and above the streak is a transverse band formed by two faint lines of dark indistinct crescents including a pale band; secondary wings darker at the apex.

N. B. In the Nova Scotia specimens the discoidal spots are silvery, while in that from Canada their lustre is golden. The synonymy of this species seems very doubtful; the metallic signature can scarcely be said to represent either a mark of interrogation, or a Greek Iota reversed; they most resemble a semicolon.

IX.—DIPTERA.

FAMILY CULICIDÆ.

433. CULEX PUNCTOR *Kirby*.—Length of body 3⅓ lines. Two specimens taken in Lat. 65°.

Body black. Proboscis longer than the trunk; sheath black; valvules and lancets testaceous; palpi somewhat incrassated towards the apex; antennæ broken off in both specimens; wings white, iridescent, with testaceous nervures, without scales, hairs and fringe; legs testaceous.

[310.] FAMILY TIPULIDÆ.

434. TIPULA PRATORUM *Kirby*.—Length of body 7 lines. Taken with the preceding.

♂. Head and trunk slate-colored. Antennæ black, with the scape yellow; thorax with four brown stripes, the lateral ones abbreviated; wings embrowned, clouded with white; nervures black, but those at the base of the wing are testaceous; there is a black dot or two near the anterior margin; and the stigma, or what represents it, is black; the poisers are pale but black at the tip; legs obscurely testaceous; thighs

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and shanks black at the tip; tarsi black; abdomen clubbed, yellow, with a longitudinal dorsal brown stripe; anal club black.

♀. Wings not spotted with white; legs distinctly testaceous, black at the joints; last joints of the tarsi black; abdomen lanceolate, yellow, with a dorsal, ventral, and on each side a lateral, brown stripe.

FAMILY BIBIONIDÆ.

[311.] 435. ASPITES (ARTHRIA) ANALIS *Kirby*.—Plate vi., fig. 8.—Length of body, excluding wings, 2 lines; including wings, 3 lines. Several taken in Lat. 65°.

Body black, naked. Head very small; trunk with a dorsal area marked out by a ridge; on each side is a reddish-yellow line drawn from the collar to the base of the wing; but in some specimens this is very indistinct; poisers white; wings hyaline, iridescent, much longer than the body; costal area divided into three areolets, with testaceous nervures, terminating in a black stigma; there are four spurious nervures, the first abbreviated, and the anal one bent towards the margin; the legs are reddish-yellow except the apex of the tarsi, which is black; the intermediate pair are smaller and shorter than the others; anterior thighs are much incrassated, and the tibiæ terminate in a spine; the posterior thighs are elongated; abdomen flat above; anus yellow, as is sometimes the margin of the ventral segments.

FAMILY EMPIDÆ.

436. EMPIS LUCTUOSA *Kirby*.—Length of body, including wings, 3 lines. Taken with the preceding.

Body entirely black. Proboscis very little longer than the head; wings a little embrowned, with a large black stigma, iridescent, nervures black.

[312.] 437. EMPIS GENICULATA *Kirby*.—Length of body 3 lines. Taken with the preceding.

Very similar to the preceding, but not so black; wings slightly embrowned, beautifully iridescent; legs, where the shank is united to the thigh, white; proboscis nearly as long as the thorax.

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FAMILY BOMBYLIADÆ.

438. BOMBYLIUS MAJOR *Linn.*—Length of body, including proboscis, 7 lines; excluding do., 5 lines. Expansion of wings 1 in. to ¾ inch. Taken in Lat. 65°.

[313.] Body black, thickly covered above with yellowish, soft, but erect hairs; underneath the hairs are whiter, but those on the breast, at the origin of the legs, are black; wings with the anterior half longitudinally black-brown, the dark color on the inner side being sinuated or uneven; the posterior half of the wings is transparent with black nervures; the legs are long, and pale-yellow; but the tarsi are reddish-black at the extremity; the eyes are triangular.

[This species is taken in Europe, and in N. America in Nova Scotia, New York, &c.]

439. BOMBYLIUS PYGMÆUS *Fabr.*—Length of body, including proboscis, 5 lines; excluding do., 3 lines; expansion of wings 9 lines. Taken with the preceding.

Body black, hairy. Hair below the eyes black; eyes meeting at the vertex; behind the eyes the hairs are gray; those on the thorax are tawny or reddish with a white tuft on each side at the anterior and posterior margin; the wings are longitudinally dusky at the anterior margin; more than the posterior half is hyaline, with several scattered black dots, the interior ones being the largest; the legs are testaceous, but black at the tip; the abdomen is covered by reddish hairs with dark ones intermingled; those at the anus are whitish.

[Taken in various localities throughout N. America.]

FAMILY TABANIDÆ.

440. TABANUS AFFINIS *Kirby.*—Length of body 7¾ lines. Taken with the preceding.

[314.] Body black with hoary down. Proboscis, palpi, and base of the antennæ obscurely, all red; down on the trunk very thin, mixed with a few black hairs; tubercles before the wings, winglets and knob of the poisers, pale testaceous; legs black with the four posterior tibiæ rufous; wings embrowned, with darker nervures; three first segments of the abdo-

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men rufous, each with a black dorsal spot; margin of the segments pale with a whitish fringe; the fourth segment has a pair of round, red, dorsal spots.

VARIETY B. Antennæ all black.

441. TABANUS ZONALIS *Kirby*.—Length of body 7½ lines. Taken with the preceding.

Body black, with a few hairs of the same color, especially at the sides of the trunk. Antennæ reddish at the base; sheath of the proboscis, and palpi, black; haustellum testaceous; breast whitish from inconspicuous down; tubercles before the wings subferruginous; wings subtestaceous with some of the nervures black; knob of the poisers reddish; thighs black, reddish at the tip; tibiæ, and tarsi, except the anterior pair, which are black, as well as the apex of the anterior tibiæ, red; abdominal segments above and below margined with white decumbent down and fringe.

442. CHRYSOPS SEPULCHRALIS *Fabr*.—Length of body 6 lines. Taken with the preceding.

[315.] Body black, slightly downy. Head hoary from pubescence; proboscis with a black sheath and testaceous haustellum; feelers black; antennæ red at the base; below the antennæ is an obtriangular levigated, and naked space, with rounded angles, and somewhat elevated; behind the antennæ in the frontal space, between the eyes, the ordinary levigated and naked areas, which in *Tabanus* are longitudinal, in *Chrysops* are transverse; sides of the trunk hairy with black erect hairs, it is also marked above with four longitudinal hoary stripes formed by invisible pubescence; underneath the trunk is covered with down of the same description and color, and set with tufts of longer hairs; wings white, with the costal margin and a middle abbreviated band, and nervures brown; legs and abdomen black, and extremity whitish from down.

[An European species.]

FAMILY SYRPHIDÆ.

443. SCÆVA RIBESII *Fabr*.—Length of body 4 lines. Taken with the preceding.

Head concavo-convex; underneath black, with the edge fringed with whitish hairs; vertex black; face below the antennæ yellowish; hoary

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from decumbent hairs next the eyes ; antennæ yellowish with a darker cloud ; trunk bronzed with a greenish tint, downy especially on the sides, down whitish ; wings hyaline, longer than the body, with black nervures, but those of the costal area are ferruginous ; scutellum large, yellow ; legs luteous, coxæ and trochanters dark-brown, posterior tarsi black, first joint below with a brush of golden colored bristles ; abdomen depressed, above black with five yellow bands, viz , one consisting of two crescents, forming an interrupted band, [316] traversing the middle of the first segment ; then a broadish subinterrupted one traversing the base of the second and third ; and lastly the margin of the two last segments is also yellow, as is the under side of the abdomen.

[An European species ; taken also in Nova Scotia.]

FAMILY MUSCIDÆ.

444. MUSCA CADAVERUM *Kirby*.—Length of body 4¾ lines. A single specimen taken in Lat. 65°.

Body black, with black hairs and bristles. Antennæ plumate ; eyes brown ; the cheeks and front in certain lights appear hoary or silvery from inconspicuous down, in others black ; feelers subferruginous ; trunk and abdomen black-blue with a greenish tint ; wings hyaline ; intermediate areolet obtusangular ; winglets white, bordered with a testaceous nervure.

This species approaches very near to *M. cadaverina*, but the front, winglets and palpi are of a different color.

445. MUSCA MORTISEQUA *Kirby*.—Length of body 5½ lines. Several taken with the preceding.

[317.] Body black, with black hairs and bristles. Eyes brown ; cheek and front ferruginous, in certain lights exhibiting something of a golden lustre ; feelers long, slender, reddish-yellow ; trunk slightly hoary, with three very indistinct black dorsal stripes ; wings hyaline, with the intermediate areolet projecting internally into an acute angle ; winglets white terminated by a white nervure ; abdomen heart-shaped, glossy, blue with a slight tint of green.

This seems to be the American representative of *M. vomitoria*, from which it differs chiefly in having three obsolete black stripes between the wings ; in the anterior spiracles not being of a different color from the rest of the trunk ; in having white winglets and not black edged with

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white; and in the abdomen exhibiting no changeable appearance of chequer-work.

VARIETY B. with a green abdomen.

C. with chalybeous abdomen.

X.—HOMALOPTERA, Leach.

FAMILY HIPPOBOSCIDÆ.

446. HIPPOBOSCA EQUINA *Linn.*—Length of body, excluding wings, 4 lines; including do., 5 lines. Locality not mentioned.

Body flat; subpubescent, dirty-yellow, spotted with brown, with whitish signatures. On the forehead, between the eyes, is a brown quadrangular spot shaped like what are called skates eggs, with four projecting points at the angles; abdomen underneath pale, anus hairy; tarsi with four black claws, the inner ones shorter and truncated; wings much longer than the body.

[An European species. Loew (*Monographs of Diptera*, part i.) divides the order of Diptera into three sections:—*Nemocera*, *Brachycera* and *Coriacea*, and includes this family, with the *Nycteribidæ*, in the last mentioned.]

[318.] XI.—APHANIPTERA.

FAMILY PULICIDÆ.

447. PULEX GIGAS *Kirby.*—Plate vi., fig. 9.—Length of body 2 lines. Two specimens taken in Lat. 65°.

Body ovate, reddish-yellow; segments, particularly the first of the trunk, pectinated with black bristles; antennæ, though short, very distinct, standing out from the head, they seem to consist of two joints, the last conical and obtuse; the base of the second segment of the trunk is

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black; the thighs are very flat and wide, inclining to ovate; tibiae armed with long black bristles.

This I believe is the largest flea known, but I have not been able to ascertain upon what animal it was captured.

(Concluded.)

ON TWO NEW CHALCID FLIES FROM FLORIDA, PARASITIC UPON THE LARVÆ OF SYRPHUS FLIES.

BY WM. H. ASHMEAD, JACKSONVILLE, FLA.

Having continued my investigations on Orange Insects, I have made many other discoveries. Among these probably the most interesting is the breeding of two species of *Chalcids* from the larvæ of *Syrphus* flies.

Now, as a general rule, the *Chalcididæ* must be considered beneficial, the majority of them preying upon other insects injurious to the agriculturist, the species belonging to the *Eurytomide* genus *Isosoma*, being, I believe, the only vegetable feeders known among them.

In my recent pamphlet on "Orange Insects," I described and figured several bred from Aphides, Coccides, etc.; besides, I have since bred hundreds from other sources, and all may be considered beneficial.

Nevertheless, there are exceptions to all rules, and those now under consideration must come under that head and be classed as injurious, because they prey upon the larvæ of flies which destroy our orange aphides—pests particularly troublesome to the orange grower in spring and fall. Another strange fact about these *Chalcids*, and which needs a thorough investigation, is this: How do so many manage to live in and subsist upon the Syrphus without destroying it at once? For it is not until the larva has transformed into a puparium, that these little parasites themselves transform—first into pupæ, and afterwards into perfect flies, which escape by eating a hole through the head of the puparium. From a single puparium I had 18 Chalcids (5 males and 13 females). On carefully opening another, I found it closely packed with Chalcid pupæ, like "sardines in a box." Undoubtedly all of these lived as minute worms in the larva of the Syrphus fly, feeding day after day on the fatty substance, but

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instinctively avoiding all vital organs. Alas, poor larva! For days the victim of these minute worms, and like the misery of some poor mortal, finds release from suffering only in death.

In Europe, Westwood, Introduction to the Modern Classification of Insects, vol. 2, p. 160, states that *Eupelinus syrphi* Bouche, infests the larvæ of *Syrphus ribesii* and *S. balteatus*. In vol. 1, p. 423, that *Spalangia nigra* is parasitic on the pupæ of the common house fly, *Musca domestica*.

In America I do not know of any having been described from Syrphus flies, excepting *Eriophilus mali* Hald. I consequently presume these are unknown to science, and submit the following descriptions:

SPALANGIA? SYRPHI, n. sp.?

♀. Length .07 inch. Head and thorax black, coarsely, uniformly, but not deeply punctate, and with slight purplish and brassy reflections. Head transverse, much broader than thorax, mandibles 4-dentate, dentations not so deep as in ♂; antennæ 11-jointed, reddish-brown, slightly but gradually widening towards tip, covered with short pubescence; thorax—parapsidal grooves converging towards scutellum, but abruptly ending at middle of mesothorax; collare very short, hardly visible, scutellum convex; abdomen ovate, brownish black, smooth and highly polished, with a slight cupreous tinge at base, and attached to thorax by a short peduncle; legs honey yellow, anterior and middle femora dark, posterior pair being brownish black; wings hyaline, iridescent, veins greenish yellow, stigma slightly thickened at base, stigmal vein with a little pointed knob near the tip.

♂. Length .05 inch. Head and thorax bright greenish golden, punctation as in ♀; antennæ 11-jointed, filiform, reddish brown and covered with rather long hairs, collare very short, hardly visible, purplish; abdomen ovate, purplish black, smooth and shining, with a short peduncle; legs honey yellow, coxæ brassy; wings hyaline iridescent.

Described from 2 ♂ and 5 ♀ specimens bred from the pupæ of *Syrphus philadelphicus*.

PTEROMALUS 4-MACULATÆ, n. sp.

♀. Length .05 inch. Head wider than thorax, bluish purple, microscopically punctate, with mouth parts brownish black; eyes brownish, antennæ 9-jointed, reddish brown, scape very long, as long as all the others combined excepting club; 2nd joint as long as 3 and 4 combined and

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thicker; 3rd shortest, others slightly widening towards tip; 9th broadly fusiform and longer than joints 6, 7 and 8 combined; thorax about twice as long as broad, microscopically punctate and with a slight brassy tinge and sparsely pubescent; collare hardly visible; praescutum much broader than long, convex, occupying nearly the whole mesothorax, scuti small, triangular and purplish; scutellum rather large, convex, triangular, tinged with brassy and with the basal margin purplish; pleuræ large, convex, smooth and shining; abdomen very short, sessile, flattened and triangular when seen from above; legs—coxæ brownish, femora and more than half of the tibiæ brownish yellow, tip of femora and balance of tibiae and feet honey yellow, hind legs with rather long tibial spur; wings hyaline, iridescent, with only a short costa and stigmal vein, reaching to one-third the length of wing.

♂. Length .04 inch. Head purplish, vertex and face brassy, microscopically punctate, with a few larger punctures scattered in front of ocelli; antennae 8-jointed, filiform, scape shorter than in ♀ and with the joints irregular and covered with long hairs; callare, unlike the female, is transverse quadrate; scutellum triangular with a brassy tinge and the edges rounded; abdomen longer than in female, blackish.

Varieties of the male occur with the head, thorax and scutellum as in the female, with an attenuated, transverse collare and with 9-jointed antennae; also with coarse punctures on the face and along the margin of the eyes, and with the middle pair of femora yellowish.

These varieties are important as showing how certain species of Chalcid flies are liable to vary in coloration and structure, even those bred from the same brood.

Described from 18 females and 8 males; 13 females and 5 males raised from one larva, and 3 males and 5 females raised from another larva of *Syrphus 4-maculatus* Ashmead, in November, 1880.

This species I place in the genus *Pteromalus* provisionally, for the reason that the description was made from dry specimens and the antennae in the ♂ and the structure of the abdomen of both sexes was too much shrunken to make a critical examination.

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ON A LARVA OF MORDELLA.

BY V. T. CHAMBERS, COVINGTON, KY.

In previous numbers of the CAN. ENT. (vols. ix, p. 232, and viii, p. 137) I have given an account of a singular larva found in thorns of *Gleditschia triacanthos* or Honey Locust. I have never succeeded in rearing the imago from the larvæ found in the thorns, but the same larva —or one that I have not been able to distinguish from it—lives also in the pith of the "iron weed" *(Veronia)* and also in that of the "hog weed" or "horse weed," *Ambrosia trifida;* and in the pith of these stems is also found a Lepidopterous larva which I have not been able to rear to the imago state, but which does not seem to differ from that of *Laverna gleditschæella* found in the thorns. Both larvæ, therefore, or larvæ not yet distinguished from them, inhabit the thorns of the Honey Locust, the Iron Weed and the Horse Weed. I have bred the Lepidopterous larva from the thorns; it is that of *Laverna gleditschæella* Cham., but I have not bred the "curious larva" from them. I have bred the "curious larva" from the Iron Weed, but not from the thorns on the *Ambrosia*. It proves to be the larva of a beetle allied to *Mordella*, if it does not, as I think it does, belong to that genus. I send a bred specimen herewith; it is, I think, a common species. Please give me its name.

From the fact that it feeds in the same stems with the *Lavernæ* larvæ, I thought it probable that the *Mordella* larva fed upon that of the *Laverna*, or upon some of the other larvæ found in the thorns of *Gleditschia;* but it is more probable that the fact simply is that the pith of these plants affords food to all of the species.

I have seen the *Mordella* larva eating its way through the pith, or rather cutting its way with its mandibles, for I never saw it swallow any of the pith, nor have I found any of it in the larval intestine. It may therefore be parasitic on the *Laverna* larva, in the sense that it eats the *Laverna* where it meets it in the stem. But it must be capable of feeding and growing for a long time without meeting the Lepidopterous larva, for it is frequently found in stems and thorns in which no other larvæ have been seen.

Besides the *Laverna* and *Mordella* larvæ, many others also—of other genera and orders—feed in the *Gleditschia* thorns, as I have already stated in the papers before referred to. Thus in these thorns I have found a

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beetle larva resembling that of a *Brachys*, one of the Carabidæ one-half an inch long, one of a small bee, and one of a wasp, the names of which have been given me by Mr. W. H. Patton, but to which I cannot just now refer. Mr. Patton also informs me that the ants found in the thorns and mentioned in the former papers (loc. cit.) do not belong to the species and genera there suggested. I mention these species as being on the food of the *Mordella* larva.

But in the pith of the *Veronia* and *Ambrosia* I have found only the *Laverna* larva, that of the *Mordella*, that of one of the larger moths and which I have not succeeded in rearing, and some small Dipterous larvæ. It may be that the Hymenopterous larvæ found in the thorns will yet be found in *Veronia* and *Ambrosia;* but if not, then of course the *Mordella*, if it feeds upon them at all, is not confined to them. This latter larva excited my attention by its singular structure and mode of locomotion. Its maxillæ are much like its legs, and are used as legs ; the body is arched so that the feet are brought to bear on the lower surface, and the dorsal tubercles (or as I have elsewhere called them, the dorsal prolegs) are brought to bear upon the upper surface, and all are used as organs of locomotion, and the larva is unable to crawl when in any other position.

Dr. Packard, in the Guide, says of *Mordella* that "the larvæ are said to live in the pith of plants, and are long, sub-cylindrical, and the sides of the rings are furnished with fleshy tubercles." In this species the tubercles are on the back. Westwood (Introduction, vol. 1, p. 293) figures and describes (after Schilling) a form of *Mordella* larva certainly quite different from that of this species. It is called the larva of *M. pusilla* and is said to feed in the pith of *Artemesia*. He also mentions a larva found in the pith of Hoarhound as that of *M. pusilla*, whilst the larvae of the genus *Ripiphorus* are parasitic upon other insects. This larva most probably feeds upon the pith, but possibly it may feed upon some of the other larvae, Lepidopterous or Hymenopterous, which it meets sometimes in the pith. Not being a Coleopterist, I do not know what is known by them as to the habits of the Mordellidae now, and perhaps the facts above given may be new to some of them.

I do not know the duration of the larval state in this species. The larva may be found in the stems in fall and winter and spring, and passes into the pupa state in April and May, remaining in that state for two weeks or more.

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Since the foregoing was written I have found the same *Mordella* larva common in the galls of *Gelechia gallæ-solidaginis* Riley, in stems of *Solidago* (Golden-rod) eating into and through the walls of the galls; but not disturbing the larvae or pupae of the moth. But here it eats into the body of the wall of the cavity and does not confine itself to the pith.

NOTE ON HEMARIS BUFFALOENSIS.

BY A. R. GROTE.

The Rev. Mr. Hulst, who has arbitrarily drawn together distinct species of *Catocala*, as *C. crataegi* and *C. polygama*, forgetting that the larva of the former is described. has also referred *Buffaloensis* as a small form of *Thysbe*, or *uniformis*. But Prof. Lintner has described the larva of *Buffaloensis* (Ent. Cont. II., 8), and in answer to my enquiries Prof. Lintner states that *Buffaloensis* is well known to him and may be distinguished by the different shape of the discal cell of primaries, the cross-bar of scales nearly fusing with the lower edge of the cell and not running in the centre of it. I have myself no doubt of the validity of *Buffaloensis*, which is probably unknown to Mr. Hulst, but what I wish to call attention to is the reckless way in which distinct forms have been recently united without all the facts or literature being studied or known.

ENTOMOLOGICAL NOTES.

On the 11th of June I took a pair of *Saperda Fayi* upon thorn, a rather rare insect with Canadian collectors hitherto, I believe. Ten years ago or more I captured one, and had not met with it since, but this year amidst a general scarcity it seemed to be quite abundant here, the different collectors finding it well represented in every direction around the city. One day, coming on a favorable locality, I took 19; returning to the same place the following afternoon, I got 30, and had to leave before 4 o'clock on account of rain—going back a few days later and securing 34. I found old bushes in an exposed situation the most productive.

Hamilton, Ont. J. ALSTON MOFFAT.

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CUPES CAPITATA.

For some years past I have been, during the month of July, in the habit of collecting specimens of this pretty little beetle on the fence of a churchyard adjoining my residence. This year they were exceedingly numerous, and I captured in four days over 80, of which some 50 were females. It is curious to note that I have invariably found that certain pickets of the fence were selected by the beetles, and that out of a long distance of fencing round the sides of the church, these few pickets on one side would be the only place to find the beetle. I can give no reason for such selection—the trees and food plants round the fence are similar; they congregate for breeding purposes and then suddenly disappear, and can only be rarely found afterwards. Do any of our readers know the life history of this beetle? E. BAYNES REED, London, Ont.

THE CODLING MOTH.

Prof. E. W. Claypole, of Antioch College, Yellow Springs, Ohio, in a recent communication states that he has lately captured two specimens of this moth, *Carpocapsa pomonella*, at sugar under an apple tree. Whether they were chance captures or whether they were attracted by the sugar he is unable to form an opinion.

I received more than a year ago two specimens of *Eristalis tenax* Lin. collected in Washington Territory by Mr. H. K. Morrison. The specimens on careful comparison show no differences whatever from typical eastern ones. The peculiar hairy markings of the eyes, to which my attention was directed by Baron Osten-Sacken, are quite the same. I have specimens also from Kansas, showing that this common European fly has spread over the whole United States since it was first observed by Osten-Sacken in November, 1875, or somewhat earlier by Mr. Patton. The fly at present is very abundant in the vicinity of New Haven, making its appearance about the middle of July and remaining till cold weather, in early October being frequently found in houses and gardens. That this species should have become so very widely spread in three or four years seems remarkable, but, on the other hand, it would seem more remarkable that so conspicuous and common a fly should have entirely eluded so experienced and zealous an Entomologist as Baron Osten-Sacken, had the species really been in North America earlier.

S. W. WILLISTON, M. D.

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The Canadian Entomologist.

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NOTES ON THE PREPARATORY STAGES OF PAPILIO CRESPHONTES, CRAM.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg—Spherical, a little flattened at base, .06¼ inch in diameter, pale ochre with sometimes a greenish tinge, at others inclining to orange. Duration of this period six days.

Young Larva—Length .11 inch; the body covered with tubercles from which project small spines; color dark brown, the tubercles on all but the first of the anterior joints a little lighter, joints 6 and 11 straw color. Duration of this period three days.

After 1st Moult—Length .31 inch. General color and shape the same, the body having a shining appearance, six tubercles on each of the first four joints, the upper four more prominent, two small tubercles on the back of each of the other joints, the posterior pair more prominent, joints 6 and 11 a little paler than before. Being busy, no notes were taken of the second moult, but the general appearance was much the same. From the first to the third moult was six days.

After the 3rd Moult—Length .75 inch. Body shining, appearing more as though wet, the tubercles all disappeared except on joints 1 to 4, joint 3 the largest, from joint 4 to 5 an abrupt decrease to the size of the posterior joints; head olivaceous, the ridge on joint 1 pale olivaceous, parts of joints 5 and 6 creamy tinged with olivaceous, the terminal part of body somewhat enlarged and pearly whitish on the back, tinged with olivaceous round the edges, the rest of the body olivaceous brown. Duration of this period five days.

After 4th Moult—Length 1.25 inches; the dark parts rich dark brown; a prominent ridge over the middle of joint 3 and over the back part of joint 4 a lighter shade of brown, each ridge containing several white rings, there also being a few on the dorsum in front of the ridge on joint 4; a white band above the head, this organ when the animal is at

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rest being under joint 1, this white band reaching round the sides to the elevation on joint 4, the lateral portion mottled with olive and brown. The boundaries of the light spaces back of joint 4 varying slightly in different specimens, but in all the anterior one reaches on the sides to the first pro-leg. Each side of the dorsum on joints 8, 9, 10 is a dark brown patch with a bright elliptical violet spot in the centre, the patch more or less surrounded with mottlings of white, the last pair of patches nearly surrounded and often partly absorbed by the light that covers the rest of the body. Joints 2, 3, 4 have each four small dots of the same violet hue, while on each side of joints 8, 9 is a cluster of fine blue points. Each joint, except such as are light at this place, has a cluster of these little points below the stigmata. The light space in the middle of the body is more or less mottled with pale olive. Duration of this period to the time it suspended in its loop to change to chrysalis, five days.

Mature Larva—When full grown length 1.75 inches, width of widest part, or joint 4, .56 inch, narrowest part, or joint 10, .25 inch, of joint 11, .31 inch. The anterior part of body much thickened, a prominent ridge extending across joint 1, along the sides and over the back part of joint 4, tne latter being the highest part. Inside of this space is somewhat flattened. Back of joint 4 it tapers rather abruptly to the posterior part of joint 5, after which the body is nearly cylindrical. The scent organs about .50 inch, bright dark red. From the time of suspension to casting the last larva skin one day, or more nearly thirty hours.

Chrysalis—Length 1.50 inches, some a little shorter; the ventral side strongly arched, the dorsal incurved but not very strongly; head case long, depressed, the sides parallel, scarcely wider at base, ocellar prominences long, subpyramidal, not divergent, two teeth on the inner edge of each, a dorsal tubercle at the base of each prominence; mesonotum rather low, edges slightly carinated, anterior elevation bilobed; abdomen with a subdorsal row of small tubercles. Surface granulated. Color variable. One form gray marked with dark gray and brown, another form pale green marked with gray and brown, the latter color mostly on the head case and down the ventral part of the thorax.

The pupal period varies. One of the two observed from which these notes were taken produced the imago fourteen days after pupating, making forty days from the time the butterfly was observed depositing the egg to the imago. The other one is at writing still in chrysalis. Fourteen days

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is the shortest pupal period I have observed in rearing this species. From some former notes I have the following pupal periods of 15 specimens:

1	produced	the imago in	16 days.
4	"	"	17 "
2	"	"	18 "
3	"	"	19 "
1	"	"	20 "
2	"	"	21 "
1	"	"	22 "
1	"	"	24 "

These were the early brood producing the imagines in July, though I might say that about one-eighth of this brood, instead of hatching in July, pass the winter in this state to produce imagines in the following spring. The one that is mentioned above as having a pupal period of 14 days was deposited as an egg June 6th, and produced the imago July 16th. I can see no difference between either the larvæ or the butterflies of those fed on Prickly Ash and those fed on Orange leaves.

NOTE.—Since writing the above the second of the two from which notes were taken has produced the imago, its pupal period being 39 days. The time of hatching was August 10th, having a period of 65 days from the depositing of the egg to the imago. This is the longest period of any of the summer brood of which I have kept a record.

MEETING OF THE SUB-SECTION OF ENTOMOLOGY OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The meeting of the American Association for the Advancement of Science was held at Cincinnati, Ohio, commencing at 10 o'clock a. m. on Wednesday, the 17th of August, 1881. At the conclusion of the opening exercises the several Sections proceeded to organize, when the Sub-section of Entomology was called to order by the President, Rev. J. G. Morris. A large number of Entomologists were present, among others C. V. Riley, Washington; Cyrus Thomas, Carbondale, Ill.; Wm. H. Edwards, Coal-

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burgh, W. Va.; J. A. Lintner, Albany, N. Y.; Rev. J. G. Morris, Baltimore, Md.; Wm. Saunders, London, Ontario; E. W. Claypole, Yellow Springs, Ohio; Miss M. W. Brooks, Salem, Mass.; B. Pickman Mann, Washington; C. D. Zimmermann, Buffalo, N. Y.; A. J. Cook, Lansing, Mich.; J. D. Putnam, Davenport, Iowa; S. H. Peabody, Champaign, Ill.; V. T. Chambers, Covington, Ky., and Chas. Drury, Avondale, Ohio.

On Thursday, August 18th, the Sub-section of Entomology met at 2.30 p. m.

The first paper read was by Prof. C. V. Riley, on Retarded Development in Insects. In this paper the author recorded several interesting cases of retarded development in insects, whether as summer coma, or dormancy of certain portions of a given brood of caterpillars, the belated issuing of certain imagines from the pupa, or the deferred hatching of eggs. One of the most remarkable cases of this last to which he called attention was the hatching this year of the eggs of the Rocky Mountain Locust or Western Grasshopper, *Caloptenus spretus*, that were laid in 1876 around the Agricultural College at Manhattan, Kansas. These eggs were buried some ten inches below the surface in the fall of 1876 in grading the ground around the chemical laboratory, the superincumbent material being clay, old mortar and bits of stone and a plank sidewalk above this.

In removing and regrading the soil last spring, Mr. J. D. Graham noticed that the eggs looked sound and fresh, and that they readily hatched when exposed to normal influences; the species being determined by Prof. Riley from specimens submitted by Mr. Graham. Remarkable as the facts are, there can be no question as to their accuracy, so that the eggs actually remained unhatched during nearly four years and a half, or four years longer than is their wont. This suggests the significant question: how much longer the eggs of this species could under favoring conditions of dryness and reduced temperature, retain their vitality and power of hatching.

Putting all the facts together, Prof. Riley concludes that we are yet unable to offer any satisfactory explanation of the causes which induce exceptional retardation in development among insects. The eggs of Crustaceans, as those of *Sepus* and *Cypris*, are known to have the power of resisting drouth for six, ten or more years without losing vitality, while in some cases they seem actually to require a certain amount of desiccation before they will hatch. Yet the fact remains that different species act differently in this respect, and that individuals of the same species under

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like external conditions of existence act differently, that temperature, moisture, food, &c., do not influence them alike. We can understand how this great latitude in susceptibilty to like conditions may and does in the case of exceptional seasons prove beneficial to the species by preserving the exceptional individuals that display the power to resist the unusual changes.

The next paper was by the same author, on New Insects Injurious to American Agriculture, in which attention was called to several insects hitherto unknown as injurious, which during the present year have proved very destructive to one crop or another. Such hitherto unknown and unreported injury is either caused by—1st, imported species; 2nd, native species previously known but without destructive habit; 3rd, unknown or undescribed species.

Mr. W. H. Edwards then read a paper on certain habits of *Heliconia charitonia.*

Some interesting discussions followed the reading of these papers, after which an informal discussion on Entomological subjects took place, in which many of the members joined. The meeting then adjourned.

On Friday, at 11.30 a. m., the Entomological Sub-section held another session.

The first paper, "On the Length of Life of Butterflies," was read by W. H. Edwards, followed by one on the Life Duration of the Heterocera, by J. A. Lintner, both of which will appear in the pages of the ENTOMOLOGIST.

A few remarks were made by C. V. Riley on his own extended observations on the duration of the lives of both butterflies and moths, indicating that they were as a rule of very short duration.

Cyrus Thomas stated that according to his observation the Army Worm, as a caterpillar, a chrysalis and a moth, existed in all seventy-seven days. Some observers had, however, made it seventy-six, others seventy-nine days. He contended that in confinement, in a proper temperature and with ample food, the Army Worm passed through its metamorphosis more quickly than in natural conditions.

B. P. Mann disagreed with Mr. Thomas on this latter; so also did C. V. Riley, it being contrary to their experience.

J. A. Lintner, State Entomologist of New York, then read a paper on "A Remarkable Invasion of Northern New York by a Pyralid Insect."

He said that about the middle of May, of the present year, a serious

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invasion of St. Lawrence County, N. Y., and several of the adjoining counties by the "army worm" was announced. It was stated that many pastures had been completely ruined, and the entire destruction of the pastures and meadows was threatened. Not having witnessed the operations of the army worm, he at once visited the infested locality. The reports had not been exaggerated. The injury was widespread and serious, already extending over eight of the northern counties. Hundreds of acres of grass presented a brown appearance, as if they had been winter killed. A pasture lot of fifty acres, which, ten days before, offered good pasture, was burned so that in places not a blade of grass could be seen to the square yard. Numerous dead caterpillars were adhering to the dead stems of last year's grass, which it was believed had fallen victims to starvation. The upland pastures were first attacked. The progress was remarkably rapid; entire fields were laid waste in ten or twelve days. The secrecy of the depredations was remarkable. The larvæ had seldom been seen, and never observed in active feeding. It was believed by the farmers that they fed at night, or by drawing the blades of grass into their subterranean retreats. In two instances the larvæ were observed in immense numbers, collected on the trunks of trees so that they could have been scooped up by handfuls.

The tree trunks were enveloped by a firm web of silk, spun by the caterpillars, of so firm a consistence that it could be lifted up in a sheet like a piece of woven silk. The cause of the congregation at this point could only be conjectured. It was not for feeding on the foliage, for the grasses alone were eaten by the caterpillars.

The caterpillars observed and collected by Mr. Lintner were slender, cylindrical forms, sixteen footed, of an obscure greenish color, with a shining black head. They were destitute of lines or other ornamentation, except some warty spots on their upper side. Their average length was three-fourths of an inch. He was unable to identify them with the army worm, for they were quite unlike the mature form of that species, and their habits seemed to be quite different.

On the 6th of August the first moth emerged from some cocoons furnished by Mr. J. Q. Adams, of Watertown, N. Y., and it turned out to be a *Crambus vulgivagellus*.

The interesting question as to which of our insect depredators was chargeable with the ravages in Northern New York was decided. The new enemy was found to be an inconspicuous, hitherto unobtrusive little

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Crambus. It had long been known in our cabinets, but had never before presented itself as an injurious insect.

It is probable that several accounts of injuries to pasture lands in New England States during the last three or four years, which have been ascribed either to the army worm or an unknown depredator, are due to this species. Its subsequent appearance may hereafter be recognized.

The Crambidæ are small moths with narrow front wings often marked with metallic spots and stripes, which are frequently driven up for short flights in our pastures and meadows during the fall months. Specimens of the larvæ, pupæ, cocoons and perfect insects were exhibited to the Section.

Following this three papers were read by A. J. Cook, of Lansing, Mich., "How Does the Bee Extend its Tongue?" "The Syrian Bees," "Carbolic Acid as a Preventive of Insect Ravages."

The author explained how the bee extends its tongue by means of a diagram; it is done, he believes, by forcing into the extremity of that member some of the fluid contained in the glands. In his paper on Syrian Bees he related how D. A. Jones, of Canada, and Frank Benton, of Michigan, went to Europe in search of new varieties of bees. They brought from Cyprus both the Cyprian bee and the Syrian bee, and Mr. Benton went to Ceylon and Java in search of other varieties. From the former place he brought two new species not very unlike our own, but in Java he failed to find the great Java bee. With the Syrian bees the author had Syrianized the apiaries of the Michigan Agricultural College. The Syrians are of a yellow type, closely allied to the Italian bee; they are indefatigable workers, but more irritable than other bees, especially when queenless. They are undoubtedly a valuable acquisition to American apiculture.

The next paper was by Mr. W. H. Edwards, on "The Alleged Abnormal Peculiarity in the History of *Argynnis myrina*," which was followed by one by E. W. Claypole, of Yellow Springs, Ohio, on the Buckeye Stem Borer. The writer remarked that during the spring months some of the leaves of the Buckeye tree droop and die without any obvious cause; indeed these dying leaves may be seen almost as soon as the foliage is expanded. On examination a small hole was discovered in every stalk on which a dying leaf was found, and in splitting this round stalk a living caterpillar was observed ensconced in the narrow tunnel evidently excavated by itself. The destruction of the central part of the leaf stalk

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was clearly the cause of the death of the leaf. A number of leaves were collected and the larva reared in confinement, producing a small moth closely resembling *Sericoris instrutana*. When or where the egg is laid has not been discovered. The young larvæ may be found in the leaf stalks of the Buckeye tree from the 2nd to about the 8th of May. After spending a few days in this secure retreat, it comes out and dwells for the rest of its caterpillar life in the dying leaf at the top of the stem upon which it feeds; after thus feeding for about a fortnight it passes into the chrysalis state, from which in about ten days more it emerges a moth.

The President then read his annual address.

PRESIDENT'S ADDRESS.

GENTLEMEN,—I regret exceedingly that I am compelled to begin my address by the recital of a melancholy event in the history of our Section.

About ten days after our adjournment last year, and after probably we had all arrived at home and settled down to our autumn's work, the distressing intelligence reached us of the sudden death of one of our most honored and distinguished members. He had mingled with us at Boston and had taken part in our deliberations, and though cheerful and full of hope, yet his usually buoyant temperament was plainly mellowed by advancing years, the every-day anxieties of life, and the pressure of severe intellectual pursuits. He returned home after our adjournment and immediately resumed his linguistic studies with his usual incessant ardor, for he often said to me: "I never take exercise when I am at home, but work all day and sometimes late into the night," and on the 1st of Sept., 1880, Samuel Stehman Haldeman was suddenly stricken down. His lamented death has been noticed in most of the leading papers and scientific journals of the country, accompanied with some biographical facts, for he was widely known as a scholar and scientist, and no man was more highly esteemed as a companion and gentleman. We all are aware of the distinction he achieved in letters and science in our own and foreign countries, of the learned books and papers he has written, and of the titles and prizes which his works secured for him.

If this were the proper place, it would be pleasing to dwell, even at length, upon the many valuable traits of his character, the vast extent of his diversified acquirements, and his almost unparalleled qualities as a friend and scientific fellow-laborer. I feel as if I were announcing the death and reciting the admirable virtues of a brother. For forty years he

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and I were what may properly be called "bosom friends." In early life we were engaged in similar scientific pursuits, and living but a few hours' distance from each other, our mutual visits were frequent and our warmest friendship and confiding intercourse continued uninterrupted to the end.

It is well known that in early life he devoted much of his time to our favorite science, to which he made some valuable contributions. His principal papers are: Materials toward a History of Coleopterous Longicornia of the U. S.; Corrections and Additions to this paper; Description of N. Am. Coleoptera; Cryptocephalinorum Borel. Am. Diagnosis. These papers give evidence of honest and painstaking research, patient analysis and sharp discrimination, and are profitably consulted by investigators at the present day.

Of late years he had turned his attention particularly to the study of Language, and became a distinguished member of the Philological Society. All readers know the celebrity he attained in that department and the ardor with which he pursued those studies, but notwithstanding their engrossing attractions, he never ceased to feel an interest in everything that concerned our department. It is hard for a man to forget his first love.

Thus much I thought it proper to say of the lamented Haldeman. He was no ordinary man whom you might compliment with a passing respectful obituary notice. In science and letters he was a great man. His memory will be long cherished by admiring friends. "*Idem extinctus amabitur.*" It may not be out of place to mention here one fact to me, at least, personally interesting. Less than two months ago the monument of Haldeman, chiseled out of enduring granite by Strecker, a brother Entomologist, was erected over his grave by the pious care of the skillful artist himself, who spends his days in cutting marble and granite into classic forms, and half of his nights in studying and figuring the butterflies of his own unequalled private collection.

Gentlemen, forty years ago I could count the known working Entomologists of our country with the first ten numerals. The older Melsheimer, who may properly be designated as the father of our science in this country, Say, Peck, Gould, Randall, Peale, and a few other pioneers, had died or retired, and the only workers then were Harris, of Cambridge; Major LeConte and his son John L., of the City of New York; Fitch, of the State of N. Y.; Haldeman, Melsheimer, jr., and Zeigler, of Penna., and a few others of no special note, were the only ones, as far as is at

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present recollected, who prosecuted our science with any zeal and who contributed to its progress by the descriptions of species. There were others who collected insects, but they made no claim to be scientific Entomologists. I remember distinctly when Melsheimer, Haldeman, Zeigler and I used to meet several times a year at our respective homes to read papers, discuss questions, exhibit new species, recite our Entomological adventures and then adjourn to a well appointed table. We regretted that we had no collaborators within two hundred miles, for the LeContes, in New York, were our nearest neighbors. In that day there was not a man in Philadelphia who studied insects. We then established "The Entomological Society of Pennsylvania," and after electing all our confreres in this country as honorary members, we had the audacity to confer the same distinction upon some great men abroad, whose letters of grateful acceptance indicated that they thought that the Society was something more than a club of four comparatively unknown men meeting in Haldeman's study on the banks of the Susquehannah!

And now look at the mighty change. In the Naturalist's Directory for 1880 there are no less than 436 names reported as pursuing our science. Now, whilst it is true that many of these may be collectors only, still they are more or less useful. They all must be interested in it to a greater or less extent or they would not have reported themselves as such. Be this as it may, the increase is simply wonderful and very encouraging. Doubtless there are numerous others in the country engaged in the same delightful employment whose names do not appear in the Directory.

There is no other distinct branch of science that has so many representatives in that book as ours, excepting Botany and Geology, and in Zoology specially we are ahead of the Ornithologist by over 50; the Conchologists are fewer than 100 all told, and all other specialists in Zoology are behind us. All this is cheering, and we are sure that the number of collaborators is growing every year.

But there is a still more encouraging view of the subject, which is founded not only on names, but on facts, and I am sure it will gratify the Section to hear of the number of the published contributions of our fellow workmen. True, they are not all members of this Section, but they belong to the family and we hail them as brethren of the same household.

Most of us have, of course, kept our eyes upon the various journals and have been pleased to see so many papers, and yet perhaps few of us

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have any proximate conception of their number and variety. Hence I have thought that probably the most acceptable contribution I could make at this meeting would be a complete list, as far as was possible, of all American Entomological writers since our meeting in August last, and this I have done and will present it at the proper time. Some names may have been inadvertently omitted, but these can be subsequently introduced. In order to insure perfect accuracy and fullness, I made the list of each author's writings as far as I could find them and sent it to him for correction, and I here desire to thank those gentlemen for the uniform courtesy with which they granted me their aid.

This paper will give us a better idea of the progress of our science during the past year than any other mere description possibly could.

A brief analysis of it gives 77 writers and 302 titles; 25 of these articles treat of Coleoptera; 19 of Lepidoptera; 15 of Orthoptera; 5 of Neuroptera; 10 of Diptera; 11 of Hymenoptera; 11 on Hemiptera; 8 or 10 describe larvæ of various orders; 5 or 6 are on fossil insects; a few on Myriopods and spiders, and 11 on Economic Entomology.

This brief exhibit will give an idea of what has been done as far as has been made public. Doubtless there are many other papers in preparation, and much efficient work has been privately done which may never be published.

It would be out of my province to specify any of these writings in this address, and much more to express any opinion of their relative value, or to indulge in any critical remarks. That must be left to the reviewers.

We now have four journals exclusively devoted to our science, and in several others considerable space is allotted to it. In connection with these must be mentioned the annual reports of the State Entomologists. The Proceedings and Transactions of all Natural History Societies also contain frequent articles upon the subject.

The Canadian Entomologist, Psyche, The Bulletin of the Brooklyn Ent. Society, and Papilio, should be supported by every one of us. Indeed, no man can know how our cause is advancing without them, and as it is likely that none but Entomologists read them, so much the more general should be our patronage that they may be maintained.

Each of these four seems to occupy its peculiar field. The Canadian is general and the organ of a special association. Although it is geographically *extra limital*, yet it is very near to us and a large share of its

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original papers come from this side of the Niagara. We claim it as one of our own, and being the oldest and admirably conducted, we hope that its present efficient editor may long continue to conduct it and render it still more interesting and instructive.

The next oldest is Psyche, and in relation to it I may quote what our first President said in his opening address: "Psyche, though small, is indispensable to every one occupied with the insects of North America." It covers a ground not occupied by any other periodical in the world, and is very creditable to the disinterested labors of American Entomologists. Its accuracy has never been questioned, and it is extremely desirable to secure its continuous publication. You know that it was begun by the Cambridge Entomological Club, which is really the parent of the Club of the A. A. A. S., which has now been elevated to the dignity of a Sub-Section. The Cambridge Club differs from some others in the country in freely granting the use of its library to Entomologists throughout the whole country, and hence it is very desirable that the library should be enriched and the Club thus enabled to extend its benefits still more widely.

The Bulletin of the Brooklyn Entomological Society is a spirited publication, displaying much zeal, correct diagnosis and careful description.

Papilio, the youngest of the family, is entirely devoted to Lepidoptera and thus occupies an exclusive field and cultivates it successfully. The necessity for it arose, I apprehend, from the fact that our investigators had so much that was new to publish, that room could not be found in the other journals, and when we consider that the number of our writers is increasing every year and new discoveries are constantly made, it is plain that all the journals now in existence among us could not publish all the communications unless the journals were greatly enlarged. As it is likely that all these editors render their valuable services gratuitously, and that the present patronage would not justify an enlargement, we shall have to be content for some time to come with their present size.

In conclusion, I will make bold to throw out one or two suggestions.

1. In view of the wonderful progress which our science has made in this country, has not the time come for condensed, complete, systematic books on each of the Orders, after the style of many German books that might be mentioned? Every one of us is often asked by beginners: What book would you recommend on beetles? And our answer is: there is none which contains descriptions of all our known species in

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systematic order, but you must gather them from various monographs, journals and proceedings, which are not easy to procure. This disheartens the young student. The same is to a great extent also true of butterflies, especially of Noctuidæ, and of other orders of insects, although the want is supplied in Lepidoptera more fully than in any other. But even this order, beyond the Diurnals, although hundreds of species are described, has not been brought together in systematic arrangement. The material is at hand, and nothing is wanting but a competent editor and an accommodating publisher to bring out a series of works which would contribute immeasurably to our progress.

My second suggestion is, that it would be interesting to know the extent, character and condition of the larger public and private collections in the country, with a mention of the varieties they contain. This might embrace two sections, those of our own species and those of foreign countries. A paper on this subject for next meeting would be an interesting contribution, and I hope some gentleman will furnish it; or let some member be appointed, so that there may be no conflict, and the whole field be open to him. No doubt the owners of private collections and the curators of public ones would cheerfully render him their counsel and aid.

And now, gentlemen, congratulating you upon our meeting again, let us proceed to our business and prosecute it with vigor, patience and order.

JOHN G. MORRIS.

At the conclusion of the address a vote of thanks was tendered to the President, coupled with the request that the copy be sent to the CANADIAN ENTOMOLOGIST for publication, which was kindly assented to.

(To be Continued.)

CARBOLIC ACID AS A PREVENTIVE OF INSECT RAVAGES.

(Read before the Sub-Section of Entomology of the A. A. A. S.)

BY A. J. COOK, LANSING, MICH.

One year ago I gave at the Boston meeting of the Association for the Advancement of Science the results of some experiments in the use of London purple to destroy the codling moth larva, and bisulphide of carbon in fighting the cabbage maggot and squash borer. These experi-

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ments have been repeated the present season, and with results no less favorable than those reported one year ago. I think it is an established fact that the methods recommended are valuable. They not only seem reliable, but they promise to be the cheapest and most desirable modes that can be made practicable on all occasions.

As stated last year, the bisulphide of carbon will also destroy the radish maggot *(Anthomyia raphani)*, but owing to the great number of plants to be treated, the amount of the liquid necessary to do thorough work is large, and so the expense is perhaps too great to warrant its use in case of this insect. The present season I tried to see if we might not make the application in a few places about the bed, at some distance apart, and still effect our purpose to destroy the maggots. The result does not recommend this liquid for the destruction of the radish Anthomyia with the same emphasis that we may safely give in advising its use for the cabbage Anthomyia and the squash Ægerian. This fact led me to cast about for some more desirable agent to be used against the radish fly, and it occurred to me that carbolic acid, which is not only very repellant to insects, but also quite as remarkable in retaining its obnoxious odor for a long time, might be made most serviceable in this warfare.

I prepared some of this material as follows: To two quarts of soft soap I added two gallons of water. This was then heated to a boiling temperature, when one pint of carbolic acid (in a crude state) was added. This mixture is then set away in a barrel or other vessel, and is ready for use as occasion may require. I mixed one part of this liquid to fifty parts of water, to be used on the radish plants. It was used by three parties in three places. Mr. Lee used it in the College garden, a student—Mr. E. Hale—used it on a bed specially prepared, and I used it in my own garden. Mr. Lee sprinkled it on the plants and poured it into a trench made close beside the row of plants. Mr. Hale and myself sprinkled it directly on the plants. Messrs. Lee and Hale made but one application and found that it kept the insects at bay for about two weeks. Even this proved of no little service. I made the application once every week, and the radishes were almost entirely free from the maggots. My bed was seventy or eighty rods from the other beds. But I caught the flies about my garden, and plants near by, not treated, were badly injured by the maggots. Two cautions should be urged; first, sprinkle the plants as soon as they are up, and thereafter every week or ten days; secondly, the mixture, if sprinkled directly upon the plants, must not be so concentrated

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as to injure the plants. My experiments this season make me feel certain that this will prove a valuable remedy, and if cheaper, it may even replace the explosive bisulphide of carbon in fighting the cabbage maggot and the squash Ægerian.

About my house at the Michigan Agricultural College I have planted a little apple orchard of eight trees. The trunks and larger branches of these trees have been thoroughly washed twice each spring, the last week of May and the last week of June, with soft soap. A neighbor but a stone's throw distant set out some fine primates about the same time that I set out my trees. He does not believe in the use of soft soap, practically at least, and his trees are sorely disfigured and greatly injured by the *Saperda candida* and the *S. cretata*, while my trees are smooth and admired by all. I have some pear trees in the same orchard which were not treated with the soap, one of which has been much injured by the borers.

This year I used the undiluted carbolic mixture instead of the soft soap. I fully believe this to be an improvement on the soap alone, as in some cases, if but one or even two applications of the soap are made, the effect is not so long continued as to entirely prevent the borers from egg laying. The carbolic acid will tend to extend the period so that I believe two applications will in every case repel the beetles.

"ON SOME NORTH AMERICAN TINEIDÆ, BY THOMAS, LORD WALSINGHAM, F. Z. S."

BY V. T. CHAMBERS, COVINGTON, KY.

The above is the title of a paper received from the author, and published in the Proceedings of the Zoological Society of London (February 15th, 1881), in which his Lordship characterizes three new genera: PHRYGANEOPSIS—one species, *P. brunnea;* ARÆOLEPIA—one species, *subfasciella;* and EUCERATIA—two species, *castella* and *securella.* He also describes as new *Calantica polita*, *Plutella interrupta*, *P. albidorsella* and *P. vanella; Cerostoma falciferella*, *C. cervella*, *C. sublulella*, *C. dentiferella*, *C. canariella* and *C. frustella; Depressaria sabulella*, *D. argillacea*, *D. arnicella*, *D. klamathiana*, *D. posticella*, *D. nubiferella*, *D. parilella*

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and *D. umbraticostella; Menestia rubescens; Glyphipteryx regalis, G. californiæ, G. bifasciata, G. unifasciata* and *G. quinqueferella*, and *Heliodines extraneella. Plutella cruciferarum* Schrank, is mentioned as found on Mount Shasta, California (as indeed it is found, as Mr. Stainton says, wherever man eats cabbage, and perhaps wherever *cruciferæ* grow), and is identified probably with "*Tinea spilotella*" mentioned in a note in the American Naturalist, v. 8, p. 194. *Plutella porrectella* Linn. was taken also on Mt. Shasta, and on the authority of Mr. Stainton (Tin. Nor. Amer. p. 90) is identified with *P. vigilaciella* Clem.

Cerostoma instabiliella Mann. was also taken on Mt. Shasta. *Cerostoma radiatella* Donovan was taken in Oregon. *Depressaria ciliella* Stn. was taken in Oregon, but its common European form, *D. aplana* Fabr., "was conspicuously absent, nor have I met with it in any American collection," says Lord Walsingham. *D. yeatiana* was taken in Oregon, and has been received also from Texas. *D. nervosa* Haw. found in Oregon. *D. parilella* Treitschke: one specimen from the Eastern States agrees fairly with the European descriptions, whilst the Western specimens differ among themselves somewhat, and from the European species still more, so that Lord Walsingham is left in some doubt as to whether they really belong to the same species, and in case an investigation of its habits should show it to be distinct, he suggests for it the specific name of *novi-mundi. D. emeritella* Stn. found in Oregon on *Artemisia. Gelechia liturella* Walk. identified with *Menestra tortrici-formella* Clem. The locality of Lord Walsingham's specimens is not mentioned, nor is that of *Calantica polita;* the other species, except as above indicated, are from California and Oregon.

Lord Walsingham has also favored me with specimens of many of the above-mentioned species and some others. All of the species described as new are I think undoubtedly so, and some of the species previously known are new to America. *Phryganeopsis* "should be placed near the genus *Incurvaria.*" *Calantica polita* is the first species of the genus found in America. The genus *Areolepia* is near *Plutella* Schrank and *Plutelloptera* Cham. *Plutella interrupta* is the American representative of the European *P. annulata* Curtis. Lord W. thinks (and no doubt he is right) there is scarcely sufficient evidence of the existence of *Cerostoma xylostella* Linn. in America, and as *C. brassicella* Fitch has already been identified with *Plutella cruciferarum*, the eight species found by his Lordship on the Pacific Coast are the first that have been found in North

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America, and two of these (*instabiliella* and *radiatella*) were already known in Europe. The genus thus seems to be confined to the Pacific Coast in this country.

His Lordship gives some valuable notes upon the genus *Depressaria*. Thus he thinks that *D. georgiella* Walker belongs to the genus *Trichotaphe* Clem., and would more properly be included in *Gelechia* than in *Depressaria*. *D. clausella* Walker is *D. cinereocostella* Clem., and *D. confertella* Walker is *Cryptolechia (Machimia) teutoriferella* Clem. "It has since been described by Mr. Chambers under the name of *Depressaria fernaldella*. I am assured by Prof. Fernald that he is well acquainted with the species" (*fernaldella?*) "and that it agrees with a specimen of the true *C. teutoriferella* which I received from him for comparison with Mr. Walker's *D. confertella*. But I am aware that Mr. Chambers himself still doubts their identity." I have never had an opportunity to compare *fernaldella* with *teutoriferella*, but as stated in the U. S. Geol. & Geog. Survey, I described *fernaldella* as distinct from *teutoriferella* because I could not recognise it in Dr. Clemens' description of the latter, though there admitting the fact that they might nevertheless be the same. Lord Walsingham mentions that *D.? pallidochrella* Cham., *D.? rileyella* Cham. and *D.? versicolorella* Cham. are by me doubtfully referred to *Gelechia*. I now think that whether these species are properly referable to *Gelechia* or not, they do not belong to *Depressaria*, and after eliminating these, "we have then eleven unquestioned species of *Depressaria*, viz., *D. atrodorsella* Clem., *cinereocostella* Clem., *clausella* Walker, *eupatoriella* Cham., *grotella* Robinson, *helaclina* De G., *hilarella* Zell., *nebulosa* Zell., *pulvipennella* Clem. (*pulvipumella* in Lord W.'s paper is no doubt a misprint), *robiniella* Pack. and *scabiella* Zell." So says Lord Walsingham, and probably he is right, though I have some doubts about *robiniella*, which, however, I have not seen.

Passing on to the genus *Glyphipteryx*, the species are all undoubtedly new except perhaps *G. Californiæ*, which will probably prove to be identical with that described by me as *G. montisella* from Colorado. There are specimens of *montisella* in my collection in Cambridge Museum and in some other collections, but I have none now at hand for comparison. I think it highly probable, however, from my recollection and notes of that species, which is very variable, that *Californiæ* will prove to be the same species. I will state here that I described *G. exoptatella* as new because I was unable to recognise it in Dr. Clemens' description of his *G. impigritella*. Neither yet now am I able to do so. Recently,

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however, I have seen an authentic specimen of *impigritella* without the means of comparing it with *exoptatella;* and I now think it not improbable that *exoptatella* will prove to be that species. *G. montisella*, however, is something quite different.

After describing *Heliodines extraneella*, Lord Walsingham proceeds to discuss the question whether the genus *Aetole* Cham. is the same with *Heliodines*. I suspected as much when I described *Aetole bella*, but my knowledge of *Heliodines* was then and is now too imperfect to me to feel certain about it. Lord W. gives my brief account of *Aetole* and Mr. Stainton's still briefer account of *Heliodines* in Ins. Brit. v. 3, with copies of Mr. Stainton's and my figures of the neuration of the genera, and alludes to the discrepancy between my printed account of the neuration of the fore wings of *Aetole bella* and my figure. The discrepancy exists, and in my original pencil sketch of the neuration I find this endorsement made by me just after the figures were published: "the published figure is incorrect in that it does not represent the apical vein as being furcate," and the original figure represents it as being furcate. This being supplied, the neuration of the fore wings is the same in the two species, and not as Lord Walsingham thinks, simply corresponding "very closely with the exception of the absence of a short vein in *Aetole*, which in *Heliodines* runs from the lower edge of the cell to the dorsal margin, and which may possibly have been overlooked." In other words, the apical vein of my figure being made furcate, the neuration of the fore wings is identical with that of *Heliodines* as represented in Mr. Stainton's figure. But the form of the wing of *Aetole* is narrower and it is more distinctly caudate. The hind wing in Mr. Stainton's figure is also wider and the median gives off a branch which is wanting in *Aetole*. These small differences, however, are perhaps unimportant, and it is more than likely that *Aetole* Cham. is the equivalent or American form of *Heliodines* Stainton; and this view is supported by the ornamentation.

Lord Walsingham's descriptions are accompanied by two plates containing twenty-eight beautiful figures of the species described, with illustrations also of the neuration of the wings and form of the head and its appendages, of *Phryganeopsis brunnea* and *Eucerotia securella*, and is a most valuable addition to our knowledge of the American *Tineidæ*. Every one interested in the group owes him "a vote of thanks," and hopes that he will persevere in so good a work, and not abandon it as the writer of this has reluctantly been compelled to do.

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NOTE ON BASILARCHIA.

BY A. R. GROTE.

Some time ago, in speaking of the discovery of Mr. Gray of intermediate specimens showing a connection between the species of *Basilarchia* (published in the CAN. ENT.) I suggested that *arthemis* was the older form, a view which I have recently been glad to know is held by Mr. Scudder. In examining Southern specimens of *ursula* or *astyanax* and *Eros* (the latter the Southern form mimetic of *Danais)* I think it possible that *Eros* stands in a nearer relation to *astyanax* than to *archippus*, although the latter is a prevalent form in Alabama. In studying this group we seem really to have to do with series of individuals scarcely hardened into species. It will I think be the most profitable genus to take up in connection with developmental studies. We have here a group which seems to exhibit the effect of various outside forces upon a comparatively plastic organization, and can thus measure perhaps the extent of the different influences brought to bear in moulding external characters in our butterflies. How much climate, selection and mimicry can effect may be here determined, and which works quicker or at the shorter distance in succession. It will be very interesting if the facts bear out the offspring of *Eros* from *astyanax* as well as *archippus*, and not the two "mimetic" forms from each other.

ENTOMOLOGICAL NOTES.

LACHNOSTERNA FUSCA.

At the last meeting of the Entom. Soc. of Ontario, Mr. J. M. Denton reported that he had seen near Delaware, Co. Middlesex, Ont., a ten-acre pasture field almost destroyed by the larvæ of this beetle, and he exhibited some specimens he had brought. The roots of the grass were completely eaten through, and the sod on being lifted came away easily in large patches, showing the larvæ underneath at their work of destruction. The owner of the land said that this spring the beetles were hovering in dense swarms over the pasture.

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Melitaea phaeton, generally very rare here, was more abundant this spring. I found the larvæ feeding on *Gerardia pedicularis;* afterwards I obtained eggs from confined females and found eggs out doors on same plant. The eggs hatched. The larvæ therefrom, and additional larvæ found out doors, feed on the above-named plant, and developed and spun up as Mr. W. H. Edwards has it in his Butterflies of N. A., vol. ii., part 4.

There grows another *Gerardia* here, the *G. purpurea*, on which the larvæ of *Junonia coenia* feed.

Callidryas eubule is found here in a few specimens every year; last year fresh specimens were in great abundance.

Terias mexicana (worn).—I have captured a small and a large specimen of this species during several years collecting.

AUG. W. HOFFMEISTER.

Ft. Madison, Lee Co., Iowa, Sept. 7, 1881.

BOOK NOTICE.

The Canadian Sportsman and Naturalist, Vol. 1, Nos. 1 to 8.

This is a monthly journal published in Montreal, and edited by Wm. Couper, a well known naturalist and sportsman. Each number contains eight pages of matter arranged in double columns, printed in first-class style and on good paper. The articles are short and interesting, treating mainly of matters pertaining to hunting and fishing, with brief descriptions of Canadian wild animals, birds, etc.

The editor's extensive experience and travels in the Lower St. Lawrence is manifest in his articles on the rivers of that district and their products. Entomology also comes in for a share of attention. The fifth number contains a valuable contribution from Dr. J. H. Garnier, of Lucknow, Ont., on the reptiles of Canada, a subject to which but little attention has yet been given in this country, but one in which there is a large and promising field for the enterprising investigator. To all lovers of sport, either with the rod or gun, this journal will commend itself. It should also be of value to all who are fond of natural history in general. We hope to see it liberally supported. The subscription price is one dollar per annum.

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The Canadian Entomologist.

VOL. XIII. LONDON, ONT., OCTOBER, 1881. No. 10

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

To the Members of the Entomological Society of Ontario.

GENTLEMEN,—While Entomology may be said to deal with small things, the abundance or scarcity of the tiny creatures called insects involves great issues. The truth of this statement has been illustrated forcibly in several directions this year, notably in the case of the Angoumois wheat moth, which has played sad havoc among the stores of corn and wheat in granaries in the South-western States. It is said to have destroyed many thousand bushels of grain, and so widespread has the evil become that it is the opinion of the New York Sun that if the Government or the farmers of America could at this time arrest the progress of this insect by expending five millions of dollars, it would be the best investment ever made by the people.

The Angoumois grain moth, *Butalis cerealella* Oliv., is a small moth the larva of which is very destructive to all sorts of grain. The female lays her eggs on the grain sometimes in the field before it is fully ripened, but more frequently in the bins in the granary. The eggs are of a bright orange red color, and in a few days there issue from them very minute whitish-colored worms, scarcely thicker than a hair, which bore into the grain and occupy it, one larva in each kernel. Each kernel contains sufficient food to support one occupant until it reaches maturity, when it changes to a chrysalis within the grain, which, although hollowed and almost entirely consumed within, appears outwardly sound and plump. On pressing between the fingers the grain is found to be soft and yielding, and when dropped into water it floats on the surface.

When the larva is full grown it spins a white silken cocoon, which occupies one end of the cavity within the grain, the other end being filled with the castings of the worm. The moth makes its escape through a small round hole in the side of the grain, which the larva cuts with its jaws before spinning its cocoon. When preparing this orifice for the

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escape of the future moth the larva is careful not to cut entirely through, but leaves a thin tissue-like skin unbroken, which the moth finally ruptures when it makes its escape. The body of the moth is about one-third of an inch long, and its wings when spread measure about two-thirds of an inch across; the fore wings are of a plain brownish-buff color, with a satin-like lustre; the hind wings above and below, as also the under side of the fore wings, are blackish-gray.

This insect is a native of the warmer parts of Europe, and has long been very destructive in France. It was introduced into the southern portion of the United States more than 100 years ago, where it has become fully naturalized. It is often brought into New York in cargoes of grain, but the climate of the Northern United States and Canada appears to be too cold to permit it to thrive amongst us, or to permanently establish itself. It has never yet, to my knowledge, been found within the limits of our Province.

The Chinch Bug, which, although always present in our midst, has happily never yet proved a serious trouble with us, has been very destructive to the corn crop in Missouri and Kansas, and combined with the drought, has seriously affected the yield of this cereal in those States.

The Army Worm has appeared during the season in some portions of the West, and inflicted much damage; and there were good reasons for anticipating trouble from this source in our own Province next year, unless the exceptional drought we have lately experienced, and which has been generally looked upon as an unmitigated evil, should check their natural increase. The Army Worm, in common with many other of our night-flying moths, is double-brooded, but whether the later brood pass the winter in the larval or chrysalis state has never been fully settled. It is probable that with us the bulk of the brood pass the inclement season in the larval condition, the young larva burrowing into the ground for protection during the extreme cold of winter. It has been observed by Entomologists that an unusually wet season which induces a free growth of vegetation is very favorable for the sustenance of these pests, and if preceded by a dry autumn, which appears to have the effect of disseminating the moths over a wider area, the worms are often met with in great abundance. During this summer the Army Worm moths (*Leucania unipuncta*), which are always present with us to a greater or less extent, have been unusually abundant in the western portion of our Province. To the sugar-bait, employed by Entomologists to attract night-flying

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moths, these insects have flocked by hundreds, and this has been observed not only in Ontario, but also in the Western States, showing that this moth has been unusually abundant over an extended district. Millions of their eggs must have been deposited on the leaves and stems of grasses, but the intense drought we have had has probably deprived the newly-hatched larvæ of the food necessary to their existence, and we may hope that the evil we have suffered from in the way of drought has saved us to a great extent from serious invasions of Army Worms next year.

Much attention has been paid of late by Entomologists to the natural conditions which favor or prevent the increase of injurious insects; and I think there is good ground for expecting, after a few more years of close observation, that it will not be difficult to prognosticate, with a large measure of accuracy, several months in advance, the probabilities as to the insect pests likely to prevail during any year in any given district. When this can be satisfactorily accomplished, much practical good may be expected to result therefrom, since by avoiding the planting of such crops as are likely to be especially injured by insect hosts, and growing others comparatively free for the time from these troubles, a large saving may be effected.

During the summer a small moth, well known to Entomologists as a common insect throughout the Northern States and Canada, but never before recorded as destructive anywhere, has invaded the pastures in some parts of Northern New York, and inflicted great injury. It is a species of Crambus, *Crambus vulgivagellus*. The Crambidæ are known by the common name of grass moths, from the fact that as far as is known they all feed in the larval state on grass, and hence the moths are found everywhere in meadows, flying about in the daytime, with a short but rapid flight. The moths are small, with narrow front wings, which are usually ornamented with metallic spots and stripes. It was about the middle of May that a serious invasion of what was popularly supposed to be the Army Worm, occurred in St. Lawrence County, New York. The State Entomologist, Prof. J. A. Lintner, at once visited the scene of destruction and found the injury widespread and serious, extending over eight of the northern counties. Hundreds of acres of grass presented a brown appearance, as if winter-killed. A pasture lot of ten acres which, ten days before, offered good pasture, was so thoroughly destroyed that in many places not a blade of grass could be seen to the square yard. The upland pastures were first attacked and entire fields were laid waste in ten

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or twelve days. Unlike the Army Worm, the caterpillars were seldom seen, and never observed actively feeding, and it was believed by the farmers that they fed at night, or by drawing the blades of grass into their subterranean retreats. In two instances the larvæ were observed in immense numbers collected on the trunks of trees so that they could have been scooped up by handfuls. The cause of their congregating at these points could not be conjectured; it was not for feeding on the foliage, for the grasses alone are their natural food. The caterpillars were slender, cylindrical worms, about three-quarters of an inch long, of an obscure greenish color, with shining black heads. They were destitute of lines or other ornamentation, excepting some small, warty spots on their upper side. Early in August the moths began to appear, when they were identified as specimens of *Crambus vulgivagellus*, the new enemy proving to be an inconspicuous and hitherto unobtrusive little Crambus. It is quite probable that several accounts of injuries to pasture lands in the New England States during the last three or four years by some unknown depredators are to be credited to this species.

At a late meeting of our Entomological Society, held in London, one of our members, Mr. J. M. Denton, referred to the injuries which were at that time being inflicted on some pasture lands within a few miles of London by the larva of the common May Bug, *Lachnosterna fusca*, and exhibited specimens of their work. He had found whole fields of pasture land with the roots of the grass so eaten that the turf could be readily lifted with the hand by the yard, and underneath were thousands of these grubs feeding on the remaining fragments of roots. In one instance, near the village of Delaware, a field had been so completely destroyed that the farmer had set fire to the withered grass with the hope of scorching the enemy to death. As these larvæ readily burrow in the ground when disturbed, he was advised to adopt a different method and turn his hogs into the field to root amongst the grass and devour the larvæ, which they greedily consume in immense numbers. Such wholesale destruction by this insect is not common, but when it does occur it is very alarming.

In the tenth annual report of the State Entomologist of Illinois, just received, mention is made of a new insect injurious to corn. This is a small beetle closely allied to the common striped Cucumber Beetle, and known to Entomologists under the name of *Diabrotica longicornis*. In Illinois the damage caused by the larva of this insect has been considerable. They are small white worms about half an inch long and very

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slender, which attack the fibrous roots of the corn, and so destroy them that the plants may be pulled up very easily with the hand. After a time the plants begin to wither and the grain fails to mature. In some instances it is believed that the injury inflicted by this tiny creature would result in the loss of fully one-third of the crop. The perfect beetle is about one-fifth of an inch long, with a width scarcely equal to half its length, and of a pale, dull greenish yellow color without spots or stripes.

The general alarm which prevailed several years ago in reference to the Colorado Potato Beetle seems now to have to a great extent subsided, and notwithstanding that the insect has been very abundant in some sections, it has not been so generally injurious, and where it has appeared in abundance prompt remedial measures have been successfully employed. It has been claimed, and, I suppose, correctly so, that this pest originally came from the canons in the Rocky Mountains, in the State of Colorado, where it is said to have fed on some wild species of Solanum growing there. It was my privilege during the latter part of August of this year to spend a week in this district, and while there I travelled fully one hundred miles through those canons. Several species of wild Solanum grow in abundance almost everywhere in the adjoining plains as well as in the canons, and every opportunity was embraced of examining them, but in no instance could I detect any evidence of the presence of the Colorado Potato Beetle in any of its stages. Besides, I saw several potato patches, and these also seemed quite free from any insect trouble. This seemed to me not a little singular in view of the extremely prolific nature of the insect. Can it be that it has migrated so completely as to leave over large areas no representatives behind, or have its natural enemies so increased as to almost annihilate the pest? Our farmers here would, I am sure, gladly hail the advent of either of these agencies should it free them from this troublesome insect.

The question of the use of the most suitable and economical poisons for the destruction of injurious insects still attracts much attention, and Paris Green continues to head the list as the most generally useful, notwithstanding the efforts which have been made by interested parties to replace it by London Purple. London Purple is an arsenical mixture, a waste product, which accumulates during the manufacture of aniline dyes. Before its introduction as an insect destroyer it had no commercial value; on the contrary, the dye makers were at considerable expense and trouble in getting rid of it as it accumulated. Arsenic, which is the active

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ingredient in this compound, is present in very variable proportions, which is just what one might expect in a waste product. Sometimes it forms less than twenty per cent. of the mixture, while other samples will contain more than forty per cent. It is associated chiefly with lime and coloring matter. The arsenic present is in a very fine state of division, and intimately mixed with the lime and other ingredients, forming a very fine powder. It is much more soluble than Paris Green, and hence more liable to scorch the foliage, while its very variable strength makes it uncertain in its effects. For these reasons London Purple is not likely to take the place of Paris Green as an insecticide, which, when unadulterated, is nearly uniform in its composition and effects. An artificial mixture of arsenic and lime of uniform strength and colored could be supplied at about the same price, and would be more reliable than London Purple; but owing to the more ready solubility of the arsenic in this form and its caustic character, it is apt, unless used with much care, to destroy portions of the tissues of the leaves on the plants to which it is applied, making them appear as if scorched or burnt.

Experiments have been carried on for the past two seasons at the Agricultural College at Lansing, Michigan, by Prof. A. J. Cook, on the use of London Purple as a remedy for the Codling Worm. Early in the summer, while the fruit was quite small, some crab apple trees were syringed thoroughly with London Purple mixed with water, and it is claimed that the poison, which, when the water has evaporated, forms a thin coating on the fruit, either prevents the Codling Moth from depositing her eggs or else poisons the young larvæ as soon as they are hatched, the result being the saving of a very large proportion of the crop from injury, while other trees near by not similarly treated bore very wormy fruit. It is also said that, as the fruit approaches maturity, the most delicate chemical tests fail to show a trace of the poison. I scarcely think that the experiments yet tried in this direction have been sufficiently extended to warrant any general conclusions being based on them, and provided it were proven that this remedy was a certain and safe one, the popular prejudice against applying such virulent poisons directly to the fruit we are to eat would be so strong as to prevent the general use of any such means. Indeed, were it generally known that the apple growers of any district were in the habit of applying arsenic in any form directly to their fruit, it would interfere very seriously with their sales, and it is doubtful if apples so treated would find a ready market anywhere.

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It is well known that the seeds of certain noxious weeds will sometimes lie dormant in the soil for almost any number of years, awaiting a favorable opportunity for germinating; but it is not so generally known that the development of insect life is sometimes similarly retarded. It has many times been observed that a few individuals out of a large brood of moths will remain in the chrysalis state over one season and produce the perfect insect the following year, thus remaining a full year more in the dormant condition than is usual, and instances are on record where the perfect insects have escaped after three years spent in this condition of torpor. Recently, Prof. Riley, of Washington, has called attention to a very remarkable case of retarded development in the eggs of the destructive Rocky Mountain Locust, *Caloptenus spretus*. These eggs were laid in 1876 on the grounds of the Agricultural College at Manhattan, Kansas. While grading the ground around the chemical laboratory in the autumn a quantity of the eggs were buried some ten inches below the surface, the covering material being clay, old mortar and bits of stone, and above this a plank sidewalk. On removing and regrading the soil last spring a number of these eggs were disinterred quite sound and fresh-looking, and when exposed to normal influences they readily hatched, so that these locusts' eggs actually remained nearly four years and a half in the ground unhatched, or four years longer than is their wont. How much longer they would have retained their vitality under favorable conditions of temperature and dryness is unknown. This point has a very practical bearing and deserves further investigation, not only in reference to the eggs of this insect, but to those of all injurious species whose eggs are deposited on or under the ground.

The Sub-Section of Entomology of the American Association for the Advancement of Science met this year at Cincinnati, Ohio, where I had the honor of representing our Society. A large number of distinguished Entomologists were present, and many useful papers read and discussions held at the meetings. An account of the proceedings will appear in our Annual Report. It having been decided to hold the next meeting of the American Association in Montreal, I trust that our representative men in all departments of science will be present to greet with a hearty welcome the distinguished scientists from the United States and abroad, who will on that occasion honor the Dominion with their presence. I have strong hopes that the Entomologists of Canada will turn out in good force.

If the progress of a science is to be indicated by its literature and the

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number of its devotees, then Entomology has made very rapid progress within the last two or three years. There are on this continent now nearly 500 persons pursuing the study of this important branch of natural history, and during the past year a large number of original papers have been published on the subject. The CANADIAN ENTOMOLOGIST, the monthly organ of our Society, continues to hold its place in the front rank among the most useful periodicals in this connection, while clustering around it now are Psyche, the organ of the Cambridge Entomological Club; the Bulletin of the Brooklyn Entomological Society; and last, though by no means least, Papilio, a journal devoted exclusively to lepidoptera and mainly to descriptions of new species, which has now completed its seventh number. All these are devoted exclusively to Entomology, and will be found of great value to every Entomologist. To these must be added the valuable reports of the U. S. Entomological Commission, whose good work is still being continued; the annual reports of the Entomologist of the Department of Agriculture at Washington, those of the several State Entomologists, the annual report of our own Society, as well as a large number of papers on the subject to be found in the transactions and proceedings of all natural history societies. There has also appeared in the Canadian Sportsman and Naturalist, edited by William Couper, of Montreal, some Entomological items of special interest to Canadian Entomologists.

In my last annual address I referred to the appointment by the Ontario Government of a Special Commission to enquire into the agricultural resources of the Province, and the progress and condition of agriculture therein. In view of the important bearing of Entomology on successful agriculture, the Government was pleased to appoint your President as one of the Commissioners. The report of the Commission has since been compiled and published, in which the insects injurious to the farmer and fruit grower have been fully dealt with; also the remedies suggested for their destruction, and the beneficial insects which prey upon them. The evidence relating to the subjects of insects and insectivorous birds occupies 104 pages in the full report, and 61 pages in the condensed report, both of which are adorned with many excellent illustrations. The eagerness with which these publications have been sought after is indicative of the estimation in which they are held by the public. It would, I think, meet a strongly felt want if some arrangement were made whereby this valuable work, so useful to every farmer, might become accessible by

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purchase to all who are seeking for it throughout the length and breadth of our Dominion. I have the honor to be,

yours very sincerely,

WM. SAUNDERS.

ON THE LENGTH OF LIFE OF BUTTERFLIES.

[Read before the Ent. Sub-Section of the Am. Ass'n at Cincinnati, 19 Aug., 1881.]

BY W. H. EDWARDS, COALBURGH, W. VA.

Not long since I received a letter from a correspondent in Europe, asking what my experience was in regard to the life of butterflies, and this led to much thinking of the matter and reference to my note books, in which for more than fifteen years I have put down everything that has come under my observation relating to butterflies. The current opinion has been that the life of such butterflies as did not hibernate was short, and that in case of hibernators their existence ended soon after copulation in the ♂, and after laying their eggs in the ♀. Dr. Boisduval says, Spec. Gen., 1, p. 28: "The existence of lepidoptera in the perfect state is generally of brief duration; the male perishes some days after copulation and the female after having finished her laying of eggs." Kirby and Spence, Introd., London, 1856, p. 41, say of the perfect insect: "Its almost sole object is now the multiplication of its kind, from which it is diverted by no other propensity; and this important duty being performed, the end of its existence has been answered, and it expires."

I believe that this is a correct statement for a general one. On the other hand, Mr. S. H. Scudder, in various publications, has spoken of butterflies of the summer generations as living for months—2 to 3 months at least.

With regard to the hibernating species, I believe it is the last brood only which hibernates, so that the individuals begin their existence about the month of September. They lay eggs in the spring as soon as the food plant is ready to receive them, and shortly die. Therefore their existence would be limited to 8 or 9 months at the outside. Per contra, Mr. Scudder asserts that Danais *Archippus* lives from a year to 15 or 16 months.

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It is not possible to say of butterflies at large exactly when one came from chrysalis, or when it expired, but in the case of any species we observe at a certain time of the year, with great regularity, fresh butterflies are on the wing, and that in a few weeks only here and there can this species be seen, the survivors being old, abraded of wing and broken. If a female be now taken, on dissection there will usually be found a few eggs in the abdomen, perhaps half a dozen, the remains of an original stock of 200 or more. Sometimes not a vestige of the eggs remain. Any collector much in the field will often have seen female butterflies on the ground, sometimes struggling, oftener dead, and if examined these will usually show no sign of violence, but plenty of old age and exhaustion.

In the case of many-brooded species we observe that, periodically, every few weeks a new brood has come, then that the butterflies are old and scarce, and suddenly great numbers of fresh ones are flying. So that in a certain number of weeks a whole generation has come and gone. But the individuals of this generation which emerge earliest, and lay their eggs soonest, will die first, and as the emergence occupies at least half the whole period of the generation, we may say, if a generation is on the wing six weeks, that three or four weeks would be the limit of existence of any particular individual. In many species, in the latitude of West Virginia and further south, there is a new generation on the wing every month, and in such case a butterfly three weeks old would be a patriarch among its kind. In New York and New England, where most species are double-brooded at least, the duration of an individual life may be a trifle greater, but no more, depending upon the time the eggs are laid.

In the case of a seasonally-dimorphic species, and still more of a trimorphic species, like Papilio *Ajax*, we can fix the limits of duration of one or more of the forms with some definiteness. In my section of West Virginia the form *Walshii* is on the wing very early; *Telamonides* appears about a month later, but occasional *Walshii* fly as late as any *Telamonides;* and by first of June the third form, *Marcellus*, appears, and almost at once completely supplants the other two. In a few days not an example of the other forms will be seen. I find many memoranda in my note books bearing on this point.

In a series of years, from 1871 to 1881, the first appearance of all the forms of *Ajax*, and the last appearance of the two spring forms, is recorded nearly every year.

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	Walshii.		Telamonides.	
	Earliest.	Latest.	Earliest.	Latest.
1871.		24 May.	24 May.	9 June.
1872.	11 April.	19 May.	29 April.	30 May.
1873.	8 April.			
1874.	27 April.		14 May.	6 June.
1875.	7 April.		27 May.	
1877.	23 March.	15 May.	18 May.	
1878.	9 March.	15 May.	3 May.	
1880.	March, early in	30 May.	19 May.	
1881.	19 April.	21 May.		

Marcellus.
Earliest.
1871. 1 June.
1872. 5 June.
1874. 6 June.
1880. 30 May.
1881. 7 June.

So that *Walshii*, during a period of eleven years, has been seen as early as 9th March, and as late as 30th May; and *Telamonides* as early as 29th April and as late as 9th June. In the one case there has been a range of 92 days, in the other of 41. The first appearance of *Walshii* depends altogether on the state of the weather. If a few fine days come early in March, some individuals will surely be seen long before the bulk of their generation; and these early comers are invariably cut off by the severe weather which follows. *Walshii* is in fact an April form here, while *Telamonides* is scarcely ever seen in April, but is a May form, not descended from *Walshii* of the same year, but like *Walshii*, coming from over-wintering chrysalids of all three forms of the preceding year. After 1st June, *Marcellus* coming from the eggs of *Walshii*, laid last of April and early in May (before which time the food plant Pawpaw, Anona triloba, does not put forth the first flower bud or leaf bud) abounds, and continues in successive generations till late in the season.

During the middle of the *Walshii* period many females may be seen, worn and broken, evidently some time out of chrysalis, and in their last days. In 1871, 10th April, I recorded that I took 3 ♀ *Walshii* "battered and broken." Whereas, a few days later, on 16th April, I took 4 fresh ♀. One half the generation was passing away while the other was

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coming on. A large proportion of these early females must die before the leaves of the Pawpaw first show themselves. In this plant the flowers precede the leaves, and these larvæ do not eat the flower, but eggs are sometimes found on the unopened flower buds and even on the stems, several days before the bursting of the leaf buds.

In 1880, 9th April, I recorded that no good examples of *Walshii* were to be had, all being worn and broken. But same year, on 20th April, I took a pair of *Walshii* in copulation, the ♀ just out of chrysalis, the wings expanded, but still limp—not wholly dried—the ♂ old and broken. Next day I took 3 pairs of same form in copulation, and in each case the female was fresh, while the male was worn and broken.*

Now in that year the first *Walshii* had been seen early in March. On 1st day of April I took a ♀; on 3rd April I recorded that I saw several females about the blossoms of the wild plum and that all were worn. Plainly one division of this generation, in the ♀, was passing away early in April, while 20th April many fresh females were coming from chrysalis. I took all these pairs in one clump of bushes inside my fence, and it is to be presumed that if plenty there, multitudes of *Walshii* were coming from chrysalis throughout this region on those days. The weather had suddenly changed from cold and blustering to fine, and the belated chrysalids were giving butterflies.

The period of *Telamonides* in these same years has been from 29th April to 9th June. In 1871, 9th June, I recorded that I confined 2 ♀ *Telamonides;* on 10th had got no eggs, and concluded from their wasted appearance that they had previously exhausted their stock. That same year, both on 24th and 28th May, I had taken females of *Telamonides* while ovipositing. On 12th May, 1872, I recorded that I shut up a ♀ *Telamonides* and got eggs; on 30th May, that I shut up 2 ♀; and add that many of this form were to be seen, but all were worn. *Telamonides*

* I have again and again noticed in many species of butterflies, where a pair have been taken in copulation, that the male will in most cases show signs of considerable age, while the female is evidently either just from chrysalis or quite recently. Boisduval, Spec. Gen., 1, p. 28, says: "In some instances two or three days elapse between chrysalis and pairing, but only when the sexes cannot come together sooner." But of the hibernators the same author says of the Vanessidæ, all which in temperate regions at least hibernate in the imago: "Their pairing does not take place till seven or eight months after the emergence of the insect." Of my own experience I know nothing as to this.

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emerges after the weather is settled, and its extreme period as observed has been 41 days, during 11 years. But in any one year it has been but one month. In 1872 the first were seen 29th April, the last 30th May. So that I doubt if any individual *Telamonides* is alive longer than three weeks.

Marcellus ♀ lays its eggs very soon after chrysalis. The eggs are in part fully formed when it emerges from chrysalis. I dissected a female a few hours after chrysalis, which emerged in my room 13th July, 1881, and found some of the eggs round and deep green (the color when laid), but not hardened externally; others were nearly formed. In *Walshii* it is different, the eggs being at first fatty masses without form. I dissected one of the females taken 21st April, 1880, before spoken of. This was just from chrysalis and in the act of pairing, but the eggs were wholly unformed. The same thing is true of *Telamonides*.

The eggs of *Ajax* are laid during several days. The female flies from leaf to leaf and deposits one at a time, and as some scrutiny is exercised, one leaf being selected while another is refused, much time is lost. So that several days may be occupied in laying 200 eggs—perhaps a week. And by this time the insect will have become worn and the wings broken. She cannot possibly exist many days after the laying is finished. That the eggs are either all mature together, or mature with great rapidity, is evident from the ease with which they are obtained in this species from females tied in a bag over the food plant. They usually lay at once and in large numbers. I noticed particularly the condition of *Walshii* and *Telamonides* during the last days of May, 1881. All were old and the males much exceeded the females in number, I should say ten to one. In 1880, 30th May, the last *Walshii* seen that year were two old males. It seems to me probable that many males never have the opportunity of pairing, and that these live longest, their lives enduring much beyond that of any female. The latter is discovered almost as soon as out of chrysalis, and several males at same time may often be seen fluttering about one female. The young males stand no chance at all in competition with the older ones. The former are for some hours limp and weak, and by the time they have attained their strength, the eager crowd of suitors, who are prying in every bush in quest of a mate, have carried off the prize. But when there are no old males, the young one may certainly pair a few hours after chrysalis. I have seen this in Argynnis *Idalia*, when a limp female was taken with a male absolutely perfect in wing and thorax, and

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therefore but lately out of chrysalis. So in Argynnis *Myrina*, where I took a pair in copulation both which had emerged in my boxes the previous night. How speedily the males expire after pairing I cannot say; they certainly do sometimes during the process. In 1872, 25th April, Mr. Mead, here at Coalburgh, took in his net a pair of *Ajax* flying by, and found the male not merely dead, but dry, and evidently it had expired many hours before. As I have said, both Boisduval and Kirby and Spence state that the males die very soon after pairing.

I think from what I have said, it will be evident that Papilio *Ajax*, which from its size and strength would seem as likely to live several months as any butterfly in our fauna, really does live but a few weeks, and probably not more than three or four, unless in case of males which have not paired; even then but a trifle longer.

Take Lycaena *Violacea*, a dimorphic species of which *Violacea* is the early form and *Pseudargiolus* the later. During 17 years past I have kept record of the first appearance of this Lycaena because it is the earliest butterfly of the year, and the harbinger of spring. The earliest date has been 17th February, and the latest date of first appearance has been 7th April. But except in one year, 1876, the earliest examples seen have been on 6th March. No flowers are in bloom so early, and the Dogwood (Cornus), on the flowers of which *Violacea* deposits its eggs, does not usually begin to put forth its flower buds till about middle of April. The eggs are not formed when the females come from chrysalis, nor till several days have passed. In 1878, 7th April, I dissected a ♀ and found no eggs. The same day the Dogwood was in bud, but I found no eggs after a long search. On 13th April I confined a ♀ over a limb of Dogwood and got 40 eggs. On 16th April, 1880, I took a pair of *Violacea* in copulation, and 17th found the first eggs of the season, though I had been watching daily for them.

On 26th April, 1881, the buds were still unopened but formed, and I found the first eggs on them. In 1879, 27th April, I found eggs, but no young larvæ. Three days later there were scores of eggs, seven on one flower head, but still no larvæ. On 1st May the larvæ were hatching.

Up to the time of laying eggs fresh males and females are to be taken and I repeatedly record this. The latest mention of *Violacea* is on 6th May in one year, when two or three were seen.

The next generation, *Pseudargiolus*, come from eggs laid by the early form, *Violacea*, in these years has been first seen once on 19th April, once

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1st May, but in the other years from 7th to 22nd May, their advent depending on the season, and on the date of the previous flowering of the Dogwood, i. e., the laying of eggs by *Violacea*.

The life, therefore, of Lycaena *Violacea* must be limited to three or four weeks at the utmost, and shortly after oviposition this form completely disappears.

There are some species which live but a short time at a particular season of the year, and being single-brooded, pass the greater part of the year in chrysalis. Of such is Anthocharis *Genutia*. I find its earliest appearance at Coalburgh recorded on 17th April, its latest on 14th May, in a series of years.

So Thecla *Henrici;* year after year I record its appearance in April, and in no other month. The earliest seen have been on 11th, the latest 29th April.

For an example of a hibernating butterfly we can have no better example than Danais *Archippus*, and it is the one which Mr. Scudder finds so remarkable in its longevity. It is of large size, and therefore readily distinguished, and is cosmopolitan. In West Virginia there are at least four, and possibly there are five generations of the imago of this species in succession, and it is the last generation which hibernates. Very early in the spring a few of the survivors may be seen about the blossoms of the peach or wild plum trees. About first of May, the leaves of the larval food-plant, Asclepias, begin to show themselves, and at once the females of *Archippus* seek them in order to deposit their eggs. I have watched carefully to see how late these old hibernating females were flying, and the latest date was 2nd June, when I took one. This I dissected, and found the abdomen free from eggs, all having been laid. Also I watched all through the season of 1878 to see what sort of females laid eggs. I had the best possible opportunity, as Asclepias abounds near my house and comes up all through the grass hereabouts. So in the lanes and along the brooks it grows in profusion, and young plants continue to come up quite into September. In every instance the ovipositing female was fresh colored, plainly not long from chrysalis. One generation of the butterflies succeeded another the season through. The first brood of larvæ raised by me came from eggs laid 2nd May. These eggs were found on the plants, and must have been laid by a hibernating female. The butterflies began to emerge from chrysalis 30th May, several days after fresh individuals of the same or first generation were observed flying abroad.

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The second brood came from eggs laid 1st June. I saw the female ovipositing, caught her and confined in bag over a plant, and got many eggs. This female was nearly perfect, and not long from chrysalis. (It was on the next day, 2nd June, that I caught the hibernating female before spoken of.) The butterflies from this brood began to emerge 25th June.

The third brood raised by me came from eggs laid 29th–30th July, by a fresh female, confined as before. (During the interval between 25th June, when the previous brood began to emerge from chrysalis, and the 29th July, when these eggs were laid, there was plenty of time for an additional brood.) The butterflies began to emerge 20th August.

The fourth brood raised by me came from eggs laid 30th August, and the butterflies from these began to emerge 29th September.

Now plainly the history of *Archippus* does not differ from that of any other many-brooded species, except that in some the chrysalis hibernates, while in others it is the imago.*

I could adduce other instances, as Argynnis *Cybele*, Satyrus *Alope*, Apatura *Celtis*, Limenitis *Disippus*, etc., but I have given enough to show that butterfly life is of short duration; that in the summer generations it cannot exceed a few weeks, and that in all cases it probably terminates shortly after copulation in one sex, and oviposition in the other; and that the current opinion on the subject among lepidopterists is correct.

NOTE.—I learn from Prof. Lintner that *Archippus* is three-brooded in New York. It may be so in the lowlands, and in the mountains be but double-brooded. But whatever the number of broods, the behavior of the species will be the same in one place as in another. This butterfly being cosmopolitan, adapted to all climates except the arctic, with a wide range of flight in the individual, often migrating indeed from one region to another, we may be sure that the length or the shortness of the season in special or in any localities cannot possibly effect a radical change in its habits. Therefore it was with much surprise that I read the following statement gravely propounded by Mr. Scudder, in Psyche for July, 1875, respecting this species, under the name of Danais *Plexippus*: "In North

* To show how readily *Archippus* lays its eggs in confinement, on 19th August, 1879, I tied a female over Asclepias, and within 24 hours had gotten 82 eggs. This also shows that the eggs mature for deposition, not singly, but *en masse*. Fourteen days later the larvæ from these eggs were pupating.

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America" (not, be it observed, in one part of it, but everywhere) "*it is single-brooded* (not double-brooded, as asserted by Mr. Riley), the butterflies hibernating. It leaves its winter quarters later in the season than other hibernating butterflies, *and continues upon the wing until July and August, laying eggs all the time,* SO THAT *the insect may be found in its earlier stages throughout most of the summer*"; and "*the perfect insect lives a full year, mingling on the wing with its own progeny, and witnessing the decay and renewed growth of the plant which nourished it.*" That is to say: the caterpillars of *Archippus* which may be found throughout most of the summer come from the eggs of these old hibernating females, and not from young females of a new generation. These last are compelled to go over winter before they can lay eggs. It follows that females hatched from the early eggs of one season must or may exist till the close of the following season, and therefore live not merely a full year, but a year plus the time from June till September.

I knew enough of *Archippus* to be assured that it had a history in no way peculiar in respect to its propagation. No butterfly on earth has a habit such as is above stated, and the author would seem to have had in his mind something quite outside of lepidoptera. But that I might be able to speak with precision, I carefully made observations reaching through the whole season of 1878, and which I have just recited herein. These were published at length in Psyche, Dec., 1878, and showed conclusively that in one part of North America the hibernating females came early from their winter quarters, began to lay eggs at first sight of the food plant, and were extinct soon after. Therefore that the hibernating female was not laying her eggs all through the summer, and did not give birth to the succession of fresh butterflies of that season. But it was clearly shown that the eggs of the hibernating female produced the first generation of butterflies, and that females of the first produced the second, the second the third, and so to the end.

I was considerably more surprised, therefore, on reading Mr. Scudder's recent book, "Butterflies," 1881, on page 136, to find this story repeated word for word, with no allusion to my published history or to the observations of Mr. Riley or any other person, and with no verification on the author's part or data whatever. The first account might have been excused in an author of restricted experience in the field, contriving in his closet a theory which should explain imperfectly observed phenomena, but what shall be said of its subsequent repetition, without note or com-

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ment, after an interval of years! "It is the longest-lived of our butterflies"; "continues upon the wing until July and August, laying eggs all the time"; "the perfect insect often lives a full year, mingling on the wing with its own progeny, and witnessing the decay and growth of the plant which nourished it"!!

Throughout this book *Archippus* is ostentatiously called THE MONARCH, I apprehend in right of its amazing history. If it lives as long for a butterfly as Methusaleh lived among men, it may be entitled to some sort of distinctive appellation, and if it has so changed the habits of its kind as to breed like a mammal, laying eggs at intervals in the closing half of its long life, and gathering its progeny about its tibiæ, perhaps it ought to have some superlative title. We read that Methusaleh lived after he begat Lamech seven hundred and eighty and two years, and begat sons and daughters, but his long life appears to have been that venerable man's sole claim to distinction. We do not read that he attained regal honors, or even the chieftainship of a tribe. In view, therefore, of this high precedent, I suggest that the correct thing would have been to designate this long-lived, phenomenal butterfly not THE MONARCH, but THE PATRIARCH.

MEETING OF THE SUB-SECTION OF ENTOMOLOGY OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(Continued from Page 189.)

On Saturday morning the Entomological Sub-section was again in session, when the following papers were read:

The Egg Case of *Hydrophilus triangularis*, by C. V. Riley; on the Oviposition of *Prodoxus decipiens*, and also one on the Cocoon of *Gyrinus* by the same author. Following these a paper was presented by B. P. Mann, entitled, Suggestions of Co-operation in Furthering the Study of Entomology; and another by C. V. Riley, on New Insects Injurious to American Agriculture.

In this latter paper the author called attention to several insects hitherto unknown as injurious, which during the present year have proved very destructive to one crop or another. Such hitherto unknown and unreported injury is either caused by, 1st, imported species; 2nd, native species previously known but without destructive habit; 3rd, unknown or

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undescribed species. The author gave an account of the injury which had been done to clover plants by a beetle, *Phytonomus punctatus*, in Yates Co., New York. The cocoons of the beetles were found on the ground in the fields, but the beetles were difficult to find on account of their shyness, as they fall to the ground when approached. Mr. Riley also reported that much injury had been done to corn in South Carolina and Georgia by a borer which was probably the larva of a Pyralid moth.

After the reading of papers an informal discussion on Entomological subjects took place.

Mr. A. J. Cook remarked that *Heliothis armigera* had attacked corn in Michigan for the first time in 1880. That was a very wet year, whereas this year had been very dry, and this season the Army Worm, *Leucania unipuncta*, had been observed injuring it for the first time.

Mr. W. Saunders said that the imagos of the Army Worm, *Leucania unipuncta*, had been unusually abundant in Ontario during the summer, and had been seen at sugar in great numbers, and referred to the fact that the destructive brood of this inseet was not the first brood. Mr. Cook had found the moths similarly abundant in Michigan.

Mr. Cyrus Thomas stated that he had positive proof that the eggs of *Leucania unipuncta* had been deposited in fields of oats. He also said that wet weather was very favorable for the development of this insect.

Mr. J. A. Lintner spoke of the great abundance of the Clover-seed Midge, *Cecidomyia leguminicola*, which was rapidly spreading over a large area. Mr. B. P. Mann considered that the rearing of insects in the house tended to prolong the life of the larvæ, and to shorten that of the pupæ. Mr. C. V. Riley agreed with him, but Mr. Thomas held the opposite view.

Mr. S. H. Peabody, speaking of the duration of life of some moths, remarked that in *Endropia* and in *Ctenucha virginica* the period of existence of the imago was short.

Mr. Riley said that *Anisota rubicunda* feeds on both the hard and soft maple trees, and that the coloring of the imago in the western limits of the region where the moth is found is very pale in color. Mr. J. A. Lintner stated that he had captured this insect at Schoharie, N. Y., having a yellow color with only a slight tinge of rose.

Mr. W. H. Edwards remarked that he had found *Thecla henrici* only in April. It feeds on the wild plum tree. The larva eats into the unripe plums, burying its head and shoulders in the fruit, and eats no other kind of food. The larva becomes full grown by the time that the plum has

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become half grown. The insect has but one brood in the year. Mr. Edwards also remarked that *Lycaena violacea* feeds upon many different food plants.

The meetings of the Entomological Sub-section were throughout very interesting and profitable, and the "brethren of the net" separated with regret, the hope being expressed by all that they might be privileged to meet again next year in Montreal.

BOOK NOTICE.

Butterflies: Their Structure, Changes and Life Histories. By Samuel H. Scudder.

We are indebted to the author for a copy of this beautiful book, a well printed octavo volume of 322 pp., illustrated with 201 figures. The work is divided into thirteen chapters, the first six of which treat of the structure of butterflies in all the stages of their growth from the egg to the perfect insect. A chapter is devoted to the internal organs of caterpillars and another to the transformation of these organs during growth. The remaining chapters deal with the life histories of these attractive insects and the changes which they undergo under varying circumstances. Following these is an appendix containing instructions for collecting and preserving insects, etc., a list of the common and scientific names of butterflies, and a list also of the food plants of their caterpillars, all written in a plain and popular style. It is a great pity that a work of this character, coming from so well known and talented an author, and containing as it does so much useful and valuable information, should be marred by the introduction of a series of new names for our butterflies which to the great bulk of the Entomologists of America seems to be a most unreasonable imposition and against which their is a general feeling of revolt. That any author should persist in carrying the rules of priority so far as to resurrect old documents the authority of which is of the most questionable value, and on the strength of these insist on the changing of nearly all the names of our butterflies, is a tax on the patience of the practical man which few can endure, and a serious bar to the progress of our favorite science. Neither do we think that the introduction of a large number of newly invented common names will add in any degree to the popularity of Entomology; it were far better, in our opinion (with few exceptions), to use the specific name of the insect for this purpose, which is as easily learnt and conveys a more definite idea than is possible with such common names as those given by this author.

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The Canadian Entomologist.

VOL. XIII. LONDON, ONT., NOVEMBER, 1881. No. 11

ON THE LIFE DURATION OF THE HETEROCERA (MOTHS).

BY J. A. LINTNER, ALBANY, N. Y.

Read before the American Association for the Advancement of Science, at its Cincinnati Meeting, August, 1881.

I have been requested by Mr. Edwards, who has presented to the Association an interesting and valuable paper, "On the Length of Life of Butterflies," to supplement it with some remarks on the *Life Duration of the Heterocera.*

The period of time passed by insects in their perfect stage, is an item in their history to which, so far as I know, very little attention has been paid. It has not hitherto been made a special subject of inquiry. When we seek to answer the question, we find that very few of our published observations bear upon it. The little that is known upon this point, in the Heterocera, would not authorise the presentation of these notes before this body, were it not that a confession of our ignorance should, and I hope may, serve as an incentive to the examination of the interesting question.

It must prove a difficult field of investigation. Observations made upon species in confinement, deprived of food and subjected to other unnatural conditions, would give only approximate results. Even here we find our knowledge extremely limited. Outside of the Sphingidæ and the Bombycidæ, scarcely anything has been done by our Lepidopterists in rearing entire broods of species. In these two families the eggs can be easily obtained, either by the "sembling" method (attraction of the male by the exposure of a newly-emerged female), or by simply pinning a captured female. Several species of the Phalænidæ are quite prompt in extruding their eggs upon being pinned, even after having been temporarily subjected to anæsthetic influence. But in the extensive family of Noctuidæ—with the winged forms of which we are so familiar, and of which our knowledge, therefore, should be the more complete—it is difficult to obtain the eggs under the restraint of confinement. I have never

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carried an oviposition of a single Noctuid to the perfect stage, nor can I recall a published record of its having been done. Further, in illustration of the veil that still hides portions of the life histories of these forms which rarely obtrude themselves upon our sight except under cover of the night, it may be mentioned that during the thirty years in which my studies have engaged me to a greater or less extent in the rearing of Lepidoptera, I do not recall an instance where I have observed the Noctuidæ *in coitu*, and therefore have no personal knowledge of the time, place, manner or duration of the initiative of Noctuid life.

It is known that in the Attacinæ, among the Bombycidæ, in confinement, the lives of the moths are very brief. The sexes mate a few hours after emerging from the pupæ, and continue in copulation for twenty-four hours or more. Oviposition may be commenced the following day, and completed within four or five days thereafter. Perhaps a week longer will complete the life period of the female—extending in all to about fifteen days. The male usually dies a few days after copulation—several days before the female.

In the Sphingidæ, the lives as observed, in confinement, are longer than in the Attacinæ, but I have no records from which to give comparative duration. Our observations upon the Phalænidæ lead us to believe that, as a general rule, their lives are shorter than are those of the Noctuidæ.

An approximation to the life period of the Noctuidæ may be obtained from the dates when the several species are observed abroad. The published records of the collections made by "sugaring" will furnish convenient data for this. I regret that at my present writing, away from books of reference, I am unable to refer to the papers of Messrs. Thaxter, Norman, Westcott* and others. From a paper published by myself in *Entomolog. Contrib.*, iv., pp. 43–51, it appears that the period of collection (embracing probably nearly the entire life period, as the examples when first taken at sugar were apparently just from pupæ, and those last taken so worn as to be hardly capable of flight) of quite a number of species was about one month. Among these may be mentioned *Habrosyne scripta, Agrotis baja, A. subgothica, A. bicarnea, A. repentis*,† *Hadena verbascoides, Gortyna sera, G. nictitans, Leucania pallens, L. phragmitidicola, L. lapidaria, L. pseudargyria, Orthodes infirma, Orthosia helva, Scoliopteryx libatrix* and *Pseudaglossa lubricalis.*

* *Psyche*, ii., pp. 34–38, 80; *Canad. Entomol.*, vii., pp. 3, 21; *Id.*, viii., p. 12.

† Now regarded as distinct from *A. messoria* Harris.

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If, in consideration of the condition of the moths when captured, the probable different time of oviposition and more or less favorable exposure of eggs, we assume that the individuals of a species continue to emerge from the pupa during one-third of the above period, there will remain, as the approximate life duration of these Noctuidæ, *a period of three weeks.*

Mr. Wm. L. Devereaux, of Clyde, N. Y., in giving the results of his collections of Noctuidæ at sugar for two years,* states that "most of the species remain for about a month." From other data which I have consulted, I think that we shall not be far from the truth if we adopt as the life-period of the larger portion of the Noctuidæ a term of three weeks.

As might be expected in so heterogeneous a family as the Noctuidæ—differing so greatly in general character, coming forth at such different seasons of the year, and varying in the number of the broods,—the life-histories of the several groups vary to the extent of preventing generalization and necessitating specific observations. For example, we find that the genera Xylina, Homoptera and Catocala have their periods of apparition much extended beyond the species above noticed. In the paper by myself, above referred to (p. 51), we find that *Xylina petulca*, *X. disposita* and *X. Bethunei* were observed for a period extending over forty-one, forty-seven and fifty-one days respectively, with a possible prolongation of the lives of some of the later individuals through hibernation and reappearance in the following spring, of six additional months. Seven species of Catocala give an average duration of forty-five days, and from Mr. Devereaux's observations, nine species of Catocala give an average period of fifty-seven days. These last may have shown a prolonged period from their extending over two years—one of which, from a more favorable season, may have included earlier dates of first appearance. It is proper to state that the above species were selected from the lists, as having been observed for the greatest length of time; the larger number gave considerably shorter terms of apparition.

In concluding these brief notes, which are quite unsatisfactory to the writer, and offered only in compliance with request, I would beg leave to suggest that good service may be rendered to Entomology by the collation from published records, and incorporation in our published lists of insects, hereafter, of the several dates of their collection or observation throughout the entire time of their appearance. The want of such data

* *Canadian Entomologist*, vol. xi., pp. 105–109, 1879.

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has been felt in the attempt to answer the question of Dr. Wiesmann, as to the duration of life of some of our insects in their perfect state. It would also be of service in the determination of the number of annual broods; it would afford a knowledge of the time for guarding against the initiative of insect attack; it would enable us in many cases to decide upon the best time for putting in our crops; it would enable collectors to seek for specimens for their cabinets when they are to be found; in short, it would furnish an essential part of the life-histories of our species. I commend it to the attention of Entomologists.

ON THE APHIDIDÆ OF FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

(Paper No. 2.)

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Family Psyllidæ (Jumping Plant-lice).

The species belonging to this interesting family have received very little attention from Entomologists generally, and considering the extent of the North American fauna, comparatively few species have been described. Of these almost nothing is known of their habits and development.

In Europe, with the exception of two or three species, as little is known of their life histories as in America. Kollar, in his Treatise on Insects Injurious to Gardens, &c., according to Westwood, *vide* Introduction, vol. 2, p. 437, gives the history of two species. As I do not possess this work, I am unable to state which these are or how much of their history is known.

According to this author, and probably one of those referred to by Westwood, the Pear Tree Psylla, *Psylla pyri* Linn., "comes forth from its winter retreat provided with wings, as soon as the buds of the fruit trees begin to expand. After pairing, the female lays her eggs in great numbers near each other on the young leaves and blossoms, or on the newly formed shoots. The eggs are oblong, yellowish, and look somewhat like grains of pollen. The young insects, soon after they are hatched,

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resemble young wingless plant-lice and are of a dark yellow color. They change their skins and color repeatedly and acquire wing-scales or rudimentary wings, then fix themselves to the bark in rows and remain sucking the sap until about to undergo their last change, when they disperse among the leaves and appear in their winged form."

This account has been copied by nearly every economic Entomologist who has had occasion to treat of these little pests. Even Dr. Harris, in his well known Treatise, nor a later writer, Prof. Thomas, give no new facts.

From my studies of some undescribed species in Florida, and other known facts respecting this family, I feel justified in stating that Kollar's account cannot possibly be correct; especially is this true with regard to its coming forth from its winter retreat provided with wings and in his description of the egg. It does not agree with my observations, nor with those of Leon Defour. To this celebrated Frenchman and indefatigable biologist are we indebted for the first accurate description of a Psylla's egg. Those interested will find an account in his "Recherches anatomiques et physiologiques sur Les Hemipteres," p. 358, and on plate xvii., fig. 191 b. c., good figures of the egg. A translated account may also be found in "Thomas' 8th Illinois Report," p. 16.

In the summer of 1879 I noticed for the first time that the leaves of the young Persimmon trees *(Diospyros virginiana)* in the vicinity of Jacksonville were very much discolored, curled and distorted; on most of them, too, were numerous small warty-like galls. A thorough examination under the curled and twisted parts of the leaves revealed numerous small, flattened, hemipterous bugs, arranged in rows, and covered with a fine mealy or powdery substance; on disturbing they secrete large watery globules, the color of milky water.

A careful study of these during the past two years has enabled me to completely work up their life history, as well as the partial histories of other species which I shall now proceed to give, after giving a list of the known N. A. species.

Genus Diraphia, Waga.

1. D. vernalis, Fitch.
2. D. femoralis, Fitch.
3. D. calamorum, Fitch.
4. D. maculipennis, Fitch.

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Genus Psylla.

1. P. pyri, Linn.
2. P. rubi, W. & R.
3. P. tripunctata, Fitch.
4. P. quadrilineata, Fitch.
5. P. carpini, Fitch.
6. P. annulata, Fitch.
7. P. urticæcolens, Fitch.
8. P. quadrisignata ? Walker.
9. P. venusta, O. S.

To these I now add

THE PERSIMMON PSYLLA.

By the middle of April this is found in considerable numbers on the leaves of the young trees, with beaks inserted, almost standing on their heads, and swaying from side to side like the motion of a vessel in a stormy sea. This motion is evidently intended to assist either in inserting the beak or in pumping up the juices of the tree.

At this time they are also caught copulating, soon after which the female begins depositing her eggs. These are very minute, 0.01 inch in length, elongate ovate, pale greenish in color, with a wavy beak beneath at thick end, and a long filament at tip of smaller end, nearly the length of the egg, and extending backwards over it. These are laid along the margin of the leaf, without regard to regularity, the female first preparing for their reception by secreting a thread-like, transparent, gummy substance along the extreme edge of the leaf; she then fastens them in place by the beak, which adheres securely to the gummy substance.

ITS LIFE HISTORY.

These hatch in from 5 to 6 days (actual observation) and the leaf from their punctures curls completely over them; under this they reside until just before the final transformation. The pupa then comes forth, attaches itself to a leaf or twig, and changes into the perfect fly, escaping through a longitudinal slit in the head and thorax. The young take from four to five weeks to mature and breed throughout the whole summer.

Like the Fig Psylla, the fall brood probably lay their eggs in crevices of the bark and twigs; these hatch at the first breath of spring, feed on the tender new shoots and leaves, and are those found fully matured by the first and second week in April.

10. PSYLLA DIOSPYRI, n. sp.

EGG.—Length hardly .01 inch. Elongate ovate, with a long filament at apex of smaller end extending backwards to near its whole length; a

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short wavy beak or filament beneath at thick end, which is used for attaching the egg to the leaf.

YOUNG LARVA.—Length about .02 inch. Flattened, elliptical, pale yellowish, pulverulent; head broad, strongly arcuate in front; antennæ short, conical; eyes reddish, large and prominent, situated well back close to thoracic margin; thorax laterally twice dilated back of middle; legs pale; margins fringed with rather long hairs.

PUPA.—Length .10 to .12 inch. Broadly flattened; yellow, greenish beneath; head not so strongly arcuate as in young larva and slightly notched in front; antennæ much longer, apparently 7-jointed, dusky at base; wing-cases very broad and projecting slightly in front of eye and considerably laterally; eyes brownish; abdomen well rounded posteriorly, 8-jointed; legs stout, pale; strongly fringed with long hairs on all sides.

IMAGO.—♂ and ♀ .10 to .12 inch; length of wings .15 inch. Black, shining and slightly pubescent, in certain lights slightly tinged with bronze. Head transverse with a deep frontal notch; eyes prominent, three ocelli black; antennæ filiform, 10-jointed, two basal joints short and stout, dusky, following joints slender, pale yellowish, slightly pubescent, terminal joint thickened, black and tipped with two short bristles; abdomen elongate, somewhat conical, black and shining; metasternum yellowish, epimeral spines long, pale yellowish; wings hyaline, apex of front pair lanceolate, veins yellowish; legs honey yellow, tibiæ shaded with brown, femora dark brown.

The male is easily distinguished by its smaller size and by the usual abdominal differences; otherwise it does not differ from the female.

The sketch on next page, fig. 12, will give one a fair representation of its various stages: *a*, egg; *b*, young larva; *c*, mature larva or pupa; *d*, imago.

THE BAY MAGNOLIA PSYLLA.

This handsome and well known tree, *Magnolia glauca*, is quite common along our creeks and swamps, and is noted far and wide for its beautiful fragrant flowers. It is often, however, greatly disfigured by the sting of a Psylla, producing a large gall on the leaves, a fact I ascertained by breeding. This species is evidently a true gall-maker. The galls are quite conspicuous on the leaves, of a large size, greenish yellow in color with a bluish plume, and when fully matured open along the side in the form of a large curved lip.

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ITS LIFE HISTORY.

The eggs I have been unable to find; it is probably possible that these are laid under the epidermis of the leaf, which may account for my inability to find any, even after a very careful examination of the leaves with my pocket lens. In the interior of the galls, which measure half an inch or more in length, I found the lice in various stages of

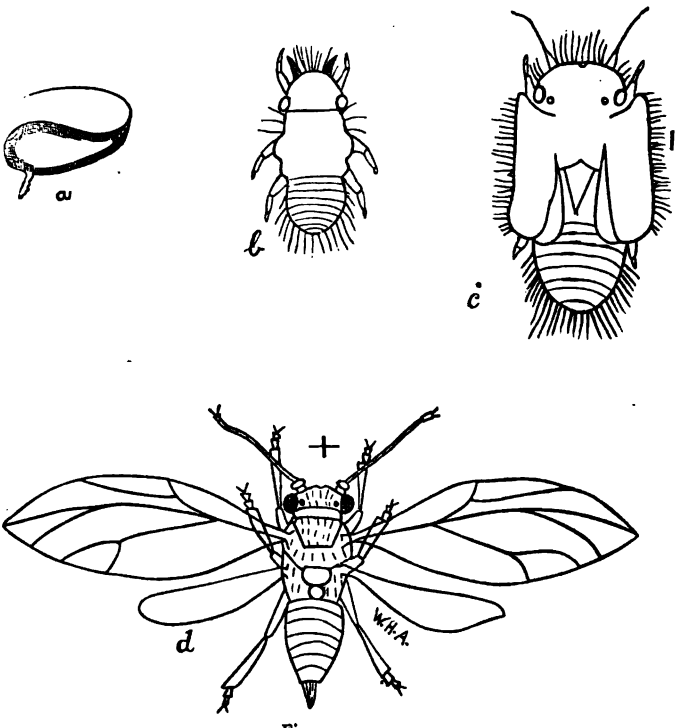

Fig. 12.

growth, generally in the midst of a watery secretion the color of milky water, which almost always fills the galls. Below I give description of different stages:

PSYLLA MAGNOLIÆ, n. sp.

YOUNG LARVA.—Length hardly .02 inch. Elongate, oval, flattened and pale yellowish in color. Head smaller and less rounded before than in previous species; eyes situated well forward; antennæ short, conical;

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abdomen more elongate, the sides of thorax not dilated and without the fringing of hairs, as in previous species.

PUPA.—Length .12 to .14 inch. Elongate, oval. Pale greenish yellow. Eyes brownish, prominent and situated further forward than in previous species; wing cases not so broad, obtusely rounded before and not projecting forward towards eyes; abdomen more elongate and notched posteriorly; legs pale; and is easily recognized by not being pubescent

IMAGO.—♂ and ♀. Length .12 inch; wing .14. Pale greenish yellow. Head transverse, not projecting much in front, and with a frontal notch, but not deep; three remote yellow ocelli, situated on yellow ground, two close to but back of eyes, and one in front between antennæ; eyes large and prominent; antennæ 10-jointed, filiform, reaching beyond tip of thorax, two basal joints short and stout, pale to tip of 6th, following joints black; collare transverse, very short, præscutum broadly obcordate; mesothorax has two large deep lateral depressions, extending backwards towards scutellum, with a slight central groove; scutellum triangular; abdomen elongate, pointed; wings hyaline, lanceolate, veins pale greenish; legs, epimeral spines and metasternum pale greenish yellow; basal tarsal joint broadly flattened. The usual structural differences distinguish the male.

THE ILEX PSYLLA.

During a recent short trip to the sea shore, my attention was called (by my friend, Mr. Curtiss) to a gall on *Ilex cassine*, a shrubby tree growing in the rich hammocks along our coasts. These were found on the terminal new leaves, measured from .2 to .3 of an inch in length, and frequently destroyed the whole shape of the leaf. Cutting these open, I found they were caused by a Psylla, and judging from the size of the pupa, is probably the smallest species known. In the galls the young were covered with a mealy powder, very much resembling certain Coccides, and when disturbed do not appear to secrete the watery globules noticed in the previously described species. Below I give description of the stages as far as ascertained:

12. PSYLLA ILECIS, n. sp.

YOUNG LARVA.—Length less than .01 inch, oval, flattened, yellow and pulverulent, with reddish eyes and pale legs.

PUPA.—Length scarcely .03 inch. Yellow, pulverulent; legs and antennæ pale, wing cases well developed and obliquely projecting on either side; abdomen rounded.

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DESCRIPTION OF THE PREPARATORY STAGES OF LIBYTHEA BACHMANNI, KIRTLAND.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—In shape are oblate spheroid, somewhat pointed at base, and a little truncated and depressed at summit; marked by many horizontal striæ, and longitudinally by 18 or 20 narrow, prominent ribs, which proceed from base and terminate, some of them irregularly, at about four fifths the distance to summit, while eight, increasing gradually in prominence, end abruptly at the rim of the summit; these long ribs are cut on either side by grooves perpendicular to the surface of the egg; they are also frequently deflected somewhat from a direct line; color pale green. Duration of this stage about 4 days.

YOUNG LARVA—Length just from egg .04 inch; cylindrical; the segments a little rounded, and four times creased transversely; covered with a fine short down; color green, semi-translucent; head twice as broad as 2; obovoid, a little depressed at suture, the vertices rounded; sparsely pilose; color yellow-brown. To 1st moult about 2 days, in July.

After First Moult—Length .08 and .09 inch; color brownish-green, the segments curved; head a little broader than 2, shape as before; color yellow-green. To next moult 2 days.

After Second Moult—Length .12 inch; same shape; upper side dark green; a faint shade of yellow over and along basal ridge, rather macular; under side, legs and feet lighter green; the segments much specked with faint white on the ridges caused by the creases; on 3, high up, a black dot on either side; head as before; color light green. To next moult 2 days.

After Third Moult—Length .26 to .28 inch; color dull green, yellowish along and over basal ridge; specked with pale white, or yellow white, as before; the black dots as before; head green. To next moult about 2 days.

After Fourth Moult—Length .4 inch. Four days later the larva reached maturity.

MATURE LARVA—.7 to .9 inch; cylindrical, thickened at 3 and 4, the dorsum of last segment abruptly curved down to the end; color dark green, the lower side, and also feet and legs, pale green; each segment four times creased transversely and on the flat ridges so caused are

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rows, one to each, of small tubercular flattened points, pale or whitish-yellow; from 2 to 13 a white stripe along base, just over the spiracles, and above this the ground is yellowish for a little way; a medio-dorsal yellow line and sometimes a fine line on middle of side; yellow tuberculated points over the legs, in arcs of from 3 to 6; on foremost ridge of 3rd segment, high on the side, a dead black tubercle, a little raised and rounded, in yellow ring; spiracles in brown ovals; surface covered with a fine short down; head obovoid, green, smooth, sparsely pilose; the ocelli brown.

Occasionally the larvæ in later stages are differently colored. One had the dorsum dark green, edged on either side by a gray line, and successively by a band of yellow, a gray line, and a black band; the 3rd segment was wholly, and 5th partly black. Two others of same brood were green, with a black band along base of body, and black patches on 3 and 11.

CHRYSALIS—Length .5 inch; helmet-shaped; compressed laterally, the abdomen somewhat carinated; mesonotum high, rounded, sloping abruptly to top of head case, much compressed and sharply carinated, followed by a deep excavation; head case not prominent, square or nearly so at top, a little excavated, the corners sub-pyramidal and scarcely at all produced; along carina of abdomen a yellow line, which forks and passes round mesonotum to top of head case; a slight yellow lateral line on abdomen; color green, either deep, or with a blue or a yellow tint; the abdomen much sprinkled with pale yellow flat points or small spots; a few of these about the head case. Duration of this stage 5 days in July, 7 days in August.

I described and figured *Bachmanni* in both sexes, and also the egg, the two later stages of the larva, and the chrysalis, in Butterflies of N. A., Vol. 2, Part 1, 1874. At that time I was unable to give the complete larval history. In subsequent years I have repeatedly taken the butterfly and observed all of the preparatory stages. It is certain that in this region this species appears in several successive generations, probably four, that the later butterflies hibernate, and the survivors are on the wing early in May, and probably in favorable seasons in April. The first generation in descent from the hibernating females are on the wing in June; the second generation in July; the third in August; and late butterflies emerge from chrysalis in September, and these would be of the fourth generation in descent from the hibernating females. The period from laying of the egg

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to emergence of the butterfly is from 15 to 17 days. The only food plant known to me is the Hackberry, Celtis occidentalis, and the eggs seem to be nearly always laid on the tender terminal leaves of the branches. By frequent cutting in some trees in my garden I have made them close headed and low, and I never look over them at the proper seasons that I do not find eggs or larvæ of *Bachmanni*. Usually one egg is laid at the end of a branch, in one of the forks, on the leaf stem, but I have seen two eggs on same stem, and occasionally an egg laid on the under side and middle of a leaf. The young larvæ on hatching ascend to the extremity of one of the leaves and remain there, stripping the sides, leaving the midrib untouched, whence it is easy to find them. They eat their way out of the egg a little below the tip, but do not eat the egg shell after emerging, and the empty shell has often guided me to the whereabouts of the young caterpillar. In all stages these larvæ when at rest arch the anterior segments, in the attitude of a Sphinx. When ready to transform they spin buttons of red silk upon the under side of a leaf—chrysalid shells being occasionally discovered in such positions—suspend after the manner of the Nymphalidæ, and in about eight hours pupate. I have noticed no variation in the colors of the larvæ in any brood but the last one of the year.

Fig. 13.

As *Bachmanni* (fig. 13) has been taken in Ontario, it would be well worth while if some lepidopterist there would seek for its eggs or larvæ on Celtis occidentalis, and determine the number of annual generations.

I subjoin notes from my journals of times of appearance and finding of eggs and larvæ :

1873. Between 25th April and 15th May, a worn female taken during my absence from home ; this was evidently a hibernator.

1st Brood.

1873. 11th June, fresh females flying, set one for eggs.
1880. 13th June, found 8 larvae in younger stages.
1881. 25th June till 9th July, found eggs and larvae daily ; first butterfly emerged 19th July.

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2nd Brood.

1874. 4th July, caught female while ovipositing; the larvae from these eggs were in chrysalis 17th July.
1876. 9th July, caught female while ovipositing.
1879. 10th and 11th July, found several eggs and young larvae.
1873. 11th July, set female for eggs; found eggs 14th and 23rd July.
1881. 1st to 8th July, found eggs and young larvæ daily.

3rd Brood.

1872. 1st August, saw female ovipositing and found a dozen eggs; 21st August, imagos from these eggs.
1873. 10th August, female ovipositing; up to 25th August continued to find eggs; on 22nd August set female for eggs.
1881. 23rd to 26th August, found eggs and larvæ.

4th Brood.

1875. 7th September, found a fresh egg, a half grown and a mature larva. 14th September, larvae in last stages.
1881. 2nd September, butterflies emerged.
" 11th " " "

NEW MOTHS, CHIEFLY FROM ARIZONA.

BY A. R. GROTE.

HADENA PERPENOA, n. s.

♂. Eyes naked; tibiæ unarmed; abdomen tufted; size moderate. Apparently allied to *Indirecta* and *Cinefacta*, but darker colored, with a certain resemblance to *Mamestra Atlantica* or *Vicina*. Concolorous dark wood brown; lines faint. The usual markings. A dash connects the claviform with the t. p. line. Stronger costal double marks inaugurate the indistinct median lines; the t. a. oblique and approaching the t. p. line near internal margin, where it seems to have a strong tooth running backward on the margin. Stigmata subequal, concolorous. S. t. line indicated, twice indented with darker shades. Fringes dark, narrowly cut with pale. Hind wings fuscous, paler at base, with mesial line and discal shade mark; beneath paler, with discal dot and faintly double extra

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mesial line. Thorax concolorous, collar and tegulæ marked with deep brown. *Expanse* 32 mil. One fresh specimen from Arizona.

MAMESTRA BISULCA, n. s.

♂ ♀. Eyes sparsely haired, tibiæ unarmed. Antennæ of the male bipectinate. Colors of *confusa*. Brown, shaded with deep brown and white. A deep brown streak from base to t. p. line along submedian interspace. Cell dark brown. Orbicular concolorous, small; reniform small, more or less white shaded. Median lines near together, feebly indicated by white shades. A deep brown shade on terminal space interrupting s. t. line opposite the cell; this dark shading intrudes again at internal angle, resolving itself into stripes bordering the veins. Pale dots at base of fringe. Hind wings fuscous with pale fringes. Beneath fuscous, dark, sub-irrorate, hind wings pale inferiorly. No lines; discal dots. Head and thorax brown; tegulae with dark edges. Collar pale tipped. *Expanse* 36 mil. Three specimens; Arizona. This may not remain in *Mamestra*, owing to the pectinated antennae. From Mr. Neumoegen's collections.

MAMESTRA TRIFOLII, var. *Oregonica*.

Under this name I register Oregon specimens which appear to belong to *Trifolii*, but differ by the concolorous fore wings, wanting the dark dashes to the subterminal line which has no M-mark, or but a faint one. The hind wings have a faintly yellowish tone. The claviform is reduced and rounded. The dark reniform entirely contrasts. Otherwise I see no differences and we have to do probably with a geographical variety. Kansas specimens are somewhat intermediary. Five specimens of the variety are before me.

SCHINIA BUXEA, n. s.

This species has the front flat, eyes naked, palpi ascending, third article distinct, squamation smooth appressed, scales of thorax flattened and broader. Pale yellow, deepening exteriorly to the brown contrasting fringes. Three fine brown lines angulated superiorly cross the outer half of primaries. Hind wings silky, whitish at base, shading to yellowish exteriorly with pale fringes. Body whitish yellow. *Expanse* 29 mil. *Habitat*, South-western Texas.

By its color and contrasting fringes and fine, nearly equidistant, thread-

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like, dark lines on fore wings easily separated from the other described forms.

ONCOCNEMIS GRACILLINEA, n. s.

♂. Size extremely small. Eyes naked. Tibiae with a large claw on anterior pair, at the inner extremity of the joint, and an outer spinule. Aspect, style of marking and color of *Cibalis*. Bright gray; apices produced. A fine longitudinal black hair streak below median vein. Indications of transverse lines on costa by trembled blackish shades. Subterminal line white, irregular, preceded by a black diffuse shade from apices, the most noticeable character of the wing, partly broken into cuneiform marks toward the middle. A fine, even, continuous, black terminal line. Fringes gray, darker tipped. Hind wings whitish, subpellucid, silky, a fine terminal line and traces of a mesial line. Fringes whitish. Head and thorax gray. *Expanse* 19 mil. Arizona, Mr. Neumoegen. This neatly marked, diminutive species is the twentieth described *Oncocnemis* from North America (see this volume, p. 34). The ground color of the fore wings is almost white, with fine black streakings; and the subterminal shade very prominent, as in *Cibalis*. The scales on the body are partly flattened and wide. The front is full. The species may be catalogued next to *Cibalis*, in my arrangement, among the gray forms.

The genus is numerous in species in our territory. We have a representative of the European *Confusa*, in *Behrensii*, from California. The nearest species to this are *Levis*, *Glennyi* and *Homogena* from Colorado, and *Augustus* from Texas. The only Eastern form is gray, like *Chandleri* from Colorado. It is the *Riparia* of Mr. Morrison, and has been taken on the coast of the Atlantic by Mr. Tepper, and by myself on the shores of Lake Erie. Its describer considered it as a variety of *Chandleri;* but I am more inclined all the time to regard it as a good species, and thus to contradict my own original idea of it, based, however, on a single specimen. I have myself now taken two, and have now seen others, and I believe the characters I have elsewhere pointed out will always distinguish it from *Chandleri*. The gray species are, then, *Chandleri*, *Riparia*, *Major*, *Aqualis*, *Cibalis* and *Gracillinea*. Another interesting group of species is that to which *Saundersiana*, from Canada and Illinois, belongs. This species is the only one, beside *Riparia*, found east of the Mississippi River. Its near ally is *Occata*, from Texas. The yellow-winged species

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from the West are becoming well known through recent collections. They are very interesting and look a little like Anartas. As yet we have three, *Dayi*, *Hayesi* and *Mirificalis;* I believe there are no European species like them. The Californian *Aterrima*, with black secondaries, is a rather small, pretty, but aberrant species, looking something like a *Tarache* at first sight.

It is interesting to note that *Fruva obsoleta*, from Illinois and Texas, is found in Arizona, from whence, also, Mr. Neumoegen has received a specimen of *Heterocampa Belfragei*. It is then likely that a number of species which as yet we only know from Texas, will be found in Arizona.

FRUVA GEORGICA, n. s.

Front with a clypeal protuberance. A little larger than *Fasciatella*, of the same olivaceous buff, dull colored. No lines. Fringes discolorous, blackish. The wing becomes stained with ochreous terminally and a dark shade extends inwardly opposite the cell from the margin. Hind wings fuscous; fringes pale. Beneath pale fuscous, costa of fore wings pale yellowish; fringes dark. The hind wings and fringes on both wings are somewhat silky.

CATOCALA ARIZONÆ Grote, Can. Ent., 163, 1873.

This species has been collected in numbers by Mr. Doll and Mr. Neumoegen has kindly presented me with an example. It is totally distinct from *Walshii*, with which I have already compared it. There is the faint glaucous shade on fore wings described by me. The primaries are more brown than in *Walshii*. I have already published my opinion that Mr. Strecker has very briefly and unrecognizably described this species under the name of *Aspasia*. *Walshii* is not found in Arizona. Both myself and Mr. Strecker compare the species with *Amatrix*. The student is referred to the descriptions published of these species.

PERISPASTA IMMIXTALIS, n. s.

This species is similarly sized with *Caeculalis*, of the same shining fuscous, quite pale beneath, but without the pellucid impressions on primaries. There can be made out the traces of a pre-apical costal curved line enclosing a slightly paler space. The wings are shaped as in its ally. New York, collected by Mr. Angus and given me by Prof Fernald.

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For some time I was inclined to consider this the ♀ of *Caeculalis*, but I make out the frenulum of my type to be single and the specimen therefore a male. The species are small and frail in this Pyralid genus and may be known by the peculiarly shaped wings.

BOTIS COMMORTALIS, n. s.

A small form no larger than *Vibicalis*, very distinctly marked and easily recognized. Fore wings brown, crossed by two mesial distinct nearly upright lines. Fringes white. Head and thorax dark. Hind wings pure white, immaculate. Beneath fore wings dark, hind wings white; legs whitish. *Expanse* 11 mil. Havilah, Calif., Mr. Edwards.

This little species must be easily recognized. It is possible that it may be placed more advantageously in an allied genus when the neuration can be studied.

(To be Continued.)

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held, according to announcement, in their rooms, Victoria Hall, London, Ont., on Monday evening, Sept. 26, 1881.

A number of those interested in Entomology were present from different parts of the Province, the President, Mr. Wm. Saunders, in the chair. The report of the Council was read and adopted, and the Sec.-Treasurer submitted his financial report, which was duly adopted.

Letters of apology for non-attendance were read from Rev. C. J. S. Bethune, Jas Fletcher, W. H. Harrington, W. Couper and G. J. Bowles.

The President then delivered his annual address, on the conclusion of which the meeting unanimously tendered Mr. Saunders a vote of thanks, with a request that his address be printed in the CANADIAN ENTOMOLOGIST.

The election of officers then took place, when the following gentlemen were declared duly elected:

President—Wm. Saunders, London.

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Vice-President—G. J. Bowles, Montreal.

Secretary-Treasurer and Librarian—E. Baynes Reed, London.

Council—Rev. C. J. S. Bethune, Port Hope; J. A. Moffat, Hamilton; James Fletcher, Ottawa; R. V. Rogers, Kingston; J. M. Denton, London; W. H. Harrington, Ottawa, and W. Couper, Montreal.

Editor—Wm. Saunders.

Editing Committee—Rev. C. J. S. Bethune, J. M. Denton, E. Baynes Reed.

Auditors—Chas. Chapman, H. Bock.

The report of the Montreal Branch was next read.

Routine business having been transacted, the chairman invited discussion on any Entomological matters.

POTATO BEETLE.

Prof. J. T. Bell, of Belleville, remarked that he had found the Potato Beetle feeding in his neighborhood on the "Bittersweet," *Solanum dulcamara*. Mr. Saunders stated that during a recent visit to Colorado, although he travelled much over the plains and through the mountain canons, he found no traces of this insect in any of its stages.

Mr. Chas. Arnold, of Paris, said that in his section the Colorado Beetle after having devoured the potato vines, attacked the tomato plants.

Mr. P. C. Dempsey, of Trenton, stated that he had preserved his tomato vines from injury by the beetle by the free use of Paris Green on his potato plants.

Mr. J. A. Moffat, of Hamilton, stated that he had observed serious injury to be caused to the young plants by the beetle.

Mr. Saunders reported that *Lebia grandis*, one of the beneficial insects which devour the larvæ of the Colorado Beetle, had been found by him in greater numbers than usual, and that he had taken a number of specimens at night when sugaring for moths. Mr. Moffat had also observed it to be common near Hamilton on the Golden-rod, *Solidago*.

COTTON WORM.

Mr. Jas. Fletcher had written to ask if any member had made any observations during the year on the moth of the Cotton Worm, *Aletia argillacea*, in reference to which an interesting discussion took place at the last annual meeting.

Mr. Moffat reported having captured several specimens, and Mr. Reed had observed their frequent occurrence attracted by light in the house at night during September.

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CABBAGE BUTTERFLY.

Mr. Saunders reported that as far as he could ascertain, the extreme western limit of this insect did not at present exceed 100 miles west of Chicago. Prof. Bell stated that he was of opinion that in the neighborhood of Belleville the common English Sparrow had proved useful in destroying the larvæ of this butterfly.

The chairman, Mr. Saunders, remarked that this was contrary to the experience of all those who had made a special study of the habits of this sparrow, and enquired whether the Professor had ever examined the crop of the bird for evidences of the presence of this larva, to which the Professor replied in the negative.

A RARE BEETLE.

Prof. Bell exhibited several specimens of *Alaus gorgops*, one of which he had captured near Belleville; and showed the peculiar points of difference between this insect and our common Eyed Elater, *Alaus oculatus*.

NEW CLOVER INSECT.

Mr. Wm. Weld, editor of the *Farmer's Advocate*, said that he had lately read in several American papers accounts of the ravages of a new clover insect, that specimens of clover heads had recently been sent him by severai correspondents, infested with an insect which he believed to be this new species, and asked whether any of the Entomologists present could give him any information as to where it had occurred and the amount of damage it was likely to cause in this Province.

Mr. Arnold thought from what he had heard from those growing clover in his vicinity that this insect was injuring the crop there. Mr. Saunders said that the insect had not yet come under his observation and that he would be very glad to receive specimens from any person who should find them in this Province.

The insect referred to is the Clover Midge, *Cecidomyia leguminicola*, a small fly which in its larval state devours the ripening seeds in the clover heads.

PEA BUGS.

Mr. Weld also enquired as to the experience of those present as to the ravages of this pest during the year.

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Mr. Arnold said that the Pea Bug had committed more damage this year in his neighborhood than ever before. Some friend had recommended him to enclose a piece of camphor in the bags of seed peas with a view of destroying the insect; this he had tried and found useless. Mr. Gott, of Arkona, had not found the beetles so plentiful this year as usual. The subject was discussed at some length, and the general opinion expressed that the most feasible remedy was to cease growing peas for a time in any district where the insect had proved seriously destructive, and thus starve them out.

THE MAPLE TREE BORER.

Prof. Bell remarked that he had found this borer, "*Clytus speciosus*," not nearly so common as formerly. Mr. Saunders said that he believed it to be increasing in the neighborhood of London, and that some of the street trees had been seriously injured by it; he also referred to the depredations of another maple borer, "*Aegeria acerni*," a small moth whose larva burrows under the bark of the red maple, "*Acer rubrum*," and in season was quite common on the trunks of the maple trees on our streets. Mr. Reed also reported the maples round his house being much infested by this pest, the empty cocoons being found protruding from the trunks of the trees in quantities during the summer.

A discussion then ensued on the probabilities of new insect pests being introduced from abroad by the importation of grains, seeds and trees, in which several of the members took part. Mr. Weld urged that the Society should call the attention of the Government to the necessity of taking every possible precaution to prevent the introduction of such insects. The President remarked that in his official capacity he had through the Provincial Agricultural Association already brought this matter before the Government, and that some steps in this direction had been taken.

The meeting then assumed an informal character and the members were shown by Messrs. Saunders, Denton and Reed many of the more interesting specimens in the Society's large collections, and also exhibited microscopic specimens illustrating the structure of insects; the valuable library of the Society was also examined by the members and added to the interest of the gathering.

After enjoying a very pleasant and profitable evening the meeting adjourned.

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The Canadian Entomologist.

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IS LIMENITIS ARTHEMIS A DOUBLE-BROODED SPECIES?

BY W. H. EDWARDS, COALBURGH, W. VA.

In Butterflies of N. A., Vol. 2, Part 8, 1879, I gave the history of *Arthemis*, and stated that it was single-brooded; that the first butterflies of the season appear in the Catskills about the end of June; that they are abundant during July; that the eggs are laid last of July and early in August; that the larvæ from these eggs pass two moults and then go into lethargy in cases of their own construction; that they come from these cases in spring and moult twice before chrysalis. I related my own experience in breeding, and I particularly say that the existence of the species is due to the eggs laid in July and early in August, because eggs laid later than this, *although by females of the same generation of the butterflies*, cannot give larvæ which shall be able to reach the hibernating stage before cold weather sets in.

Mr. Scudder, in a paper read before the Appalachian Club, at Jackson, N. H., July 12th, 1881, and printed in The Mountain Echo, 30th July, upon *Arthemis*, under the name of Basilarchia *Arthemis*, gives a very different account of the species, and declares it to be two-brooded. "Twice a year it runs the cycle of its changes . . . . As a general rule its first appearance here (in W. Mts.) is between the 16th and 20th of June, and its second late in August. . . . . About the middle of August the caterpillars now feeding will be rapidly changing to chrysalis, and in 10 or 12 days afterwards the butterfly will again be on the wing and the cycle recommences."

Mr. Scudder goes on to say: "The history I have now given does not agree with Edwards' account of the insect. He would make it out single-brooded, *having never seen or heard apparently of the September butterflies*"; adding these words in explanation of my error: "and so it probably is (i. e., single-brooded) in the southern part of its range, for all the butterflies taken south of this region of their abundance have been of the first brood; that they have not flown thither from these northern parts is proved

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by their usually greater size." It is admitted then that the species is probably single-brooded in the southern part of its range, i. e., in the Catskills. It strikes me as very singular that *Arthemis* should be single-brooded to the southward, but double to the northward—and not so very far north, either, the Catskills being from 1° to 2° only south of the White Mts.,—exactly the reverse of what happens with every other species of butterfly.

On reading the paper spoken of, I wrote the author thus: "Do you know of any one who has raised a caterpillar of *Arthemis* from egg to chrysalis and imago the same season? Did you ever do it yourself?" To this the reply came: "I have bred *Arthemis* only from the wintering caterpillars, and I know of no one who has bred them from the egg in N. Hampshire, *but you cannot get away from a fresh September brood*, which I have on the authority of three or four persons, indeed myself."

Let us look into this matter of "a fresh September brood." I will first relate briefly the experience of Mr. Mead and myself with *Arthemis* and its co-form *Proserpina*, and so far as I know, we, with Mr. C. H. Roberts, formerly of Factory Point, Vt., are the only persons who are recorded to have bred *Arthemis* from the egg. In CAN. ENT., vii., p. 162, Mr. Mead states, that in July, 1875, he had 15 females of *Arthemis* and one female of *Proserpina* confined in boxes with growing branches of willow, at Hunter, N. Y., in the Catskills. That the *Arthemis* laid about 500 eggs and the *Proserpina* 35. I myself came to Hunter just at this time, arriving 25th July, and Mr. Mead gave me many larvæ from these eggs, and I brought them to Coalburgh while they were in their 2nd and 3rd stages, i. e., after 1st and 2nd moults, reaching home 17th August. These larvæ all went into cases, the last one on 20th August, not one going on to chrysalis. On 25th Aug., I received from Mr. Mead, who was still at Hunter, more larvæ in first stage, i. e., just out of egg, and these were making their cases 9th Sept., or three weeks later than the first lot. That represents the difference, or part of it, between the time of the emerging from chrysalis of the earlier and later butterflies of the same generation. There is a similar difference in the emerging of all species of butterflies, as every lepidopterist knows. All of these larvæ, though from eggs laid by different females, and during three weeks, behaved in the same way, all going into lethargy, and none to chrysalis. Mr. Mead had taken part of the brood to New York City and some to Ithaca, N. Y., and none went to chrysalis.

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The next year, 1876, I was at Hunter from 19th Aug. to about 10th Oct. During the early part of this period a few *Arthemis* were on the wing, but they were exceedingly rare, though in July the species abounds. Mr. Mead has stated that in July, 1875, he did take 200 examples and might have taken 1,000. But this great flight was over when I reached the mountains, and only here and there was a single individual to be seen. I was out every day searching for them in order to obtain eggs. All our larvæ of 1875, excepting a small number, had died during the winter, and of these, three or four only reached chrysalis and imago in the spring of 1876, giving the form *Arthemis*. I was therefore anxious to repeat the experiment, with the hope of determining the relation of *Proserpina*, and I travelled far and wide to get females of one or both forms. With this result: on 21st Aug., I took 3 *Arthemis* ♀; on 22nd, 1 *Arthemis* ♀, 1 *Proserpina* ♀; on 24th, 2 *Arthemis* ♂, 1 *Proserpina* ♀; on 26th, 1 *Arthemis* ♀; 1st Sept., 1 *Arthemis* ♀. In all 9 butterflies, 7 ♀, 2 ♂. On 28th, I had ridden several miles among the hills, and found many Arg. *Atlantis* and other species, but I saw, but failed to take, only one *Arthemis*, a ♀, that day. Seven of the nine spoken of were taken in Stoney Clove, the coldest spot in these mountains, and the very one at which cool weather during early summer would retard the emerging of the butterflies.

It is plain that there is no "September brood" of *Arthemis* in the Catskills.

Of these females, all of which were shut up for eggs, one only laid, viz., *Proserpina* of 22nd Aug. I had kept her alive on sugar and apple, and the weather was so cold that during some days and most of the nights, I had to bring her into the house; but 1st Sept., she laid 11 eggs and died. The other females had meantime died, and on dissection were always found to contain a few nearly matured eggs, perhaps the remains of a large original stock. Though observations on other species of butterflies have led me to suspect that the latest females of a generation may develop but a very few eggs, and that these in the absence of males may generally prove sterile.

The larvæ from my *Proserpina* eggs hatched from 10th to 12th Sept., or in from 9 to 11 days. They began to reach 1st moult 18th Sept., and were all past 2nd moult 24th Sept. By 30th Sept., all were in their cases. As I stated in But. N. A., I should not have raised one of these larvæ to case had I not protected them in a warm room, and carefully preserved

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food for them. The weather was cold, nights frosty and the leaves of their food plant (Aspen) were fallen to the ground before the cases were reached. I was confident at the time that the larvæ would have perished out of doors, and that the existence of the species wholly depended on the larvæ from eggs laid by the earlier emerging females. And I believe now that the late emerging females are either sterile, or if eggs are laid later than 20th August, the larvæ perish prematurely. In nine years out of ten, the equinoctial storms come on between 15th and 20th Sept., and what the weather is thereafter, all dwellers in the mountains well know. I have seen a foot of snow here in Virginia on 26th Sept.

Now in N. Hampshire, in the White Mts., I have never supposed the climate was milder than in the Catskills. Mr. Scudder makes his second brood of butterflies emerge from chrysalis about 1st Sept. How much time is to be allowed for the eggs to mature, and to be impregnated and laid, is not stated. My own opinion is that this would require not less than 20 days, even in mid-summer. I know it takes all of that in case of the allied species, *Disippus*. But we will say 10 days, lest winter be upon us. This brings us to about 10th September, when the eggs are laid. Ten days more before hatching, and we reach 20th, just in time to enjoy the equinoctial storms. Then if haply any larvæ survive, three weeks, at the very least, must be allowed for growth to the hibernating stage, and we are in October, clear, cold, windy, and very likely a good covering of snow upon the ground! And yet Mr. Scudder says the existence of this species is due to these September caterpillars—poor little belated, benumbed, frozen and perishing creatures!

If *Arthemis* is really double-brooded in the White Mts., with a flight in September, then of course it must be so in some part of Canada. We surely cannot be asked to believe that it could be double only in one locality out of its vast range. Therefore I have written several of the lepidopterists of Quebec and Ontario on this matter, and I give their replies.

1. Mr. H. H. Lyman, of Montreal, whom I requested to present the case to the members of the Natural History Society, and collect their testimony. "I was obliged to delay my answer till after the October meeting of our Society. I have never seen any specimens of *Arthemis* in the neighborhood of Montreal in Aug. or Sept., nor have any of our Montreal entomologists."

2. Rev. Thos. W. Fyles, of Cowansville, P. Q., writes: "*Arthemis*

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is so abundant here that I have paid less attention to it than its beauty deserves. It disappears in August, but at what time of the month I cannot say."

3. Mr. J, Alston Moffatt, of Hamilton, Ont., writes: "Here are the dates of my captures of *Arthemis* for a series of years: 1873, 3rd July; 1874, June 29; 1875, June 29; 1876, July 7; 1877, June 23; 1878, June 27; 1881, July 1. They seem to fly 3 or 4 weeks, then gradually disappear. I have seen an odd one the middle of August, which I thought very late. I never saw, or heard of their being seen, in Sept., in this locality. Probably they are out a few days earlier than my first captures, but the last week in June and the first in July is when we expect them, according as the season has been late or early. I never saw or heard anything to cause the slightest suspicion of their being double-brooded."

4. Mr. Wm. Saunders, of London, Ont., writes: "With regard to *Arthemis*, it occurs with us late in June and during July, and I think early in August. I am satisfied that I have never seen one on the wing here as late as Sept., and do not think I have ever taken one after the first week in August."

I hardly think it necessary to call more witnesses from Canada.

Nor is the testimony from the Adirondacks, of New York, favorable to the existence of a second brood of *Arthemis*. Mr. W. W. Hill, of Albany, who has collected for many seasons in these mountains, which correspond in latitude to the W. Mts., says that while the species is excessively abundant in July, he has not met with it in September. In New Hampshire, Mr. C. P. Whitney, at Milford, writes: "*Arthemis* is rare in this vicinity. All told, I have not seen 25 examples, and none that I now recollect later than July."

I do not say that it is not possible for here and there a larva of *Arthemis* from eggs laid in July to go on to chrysalis and butterfly the same season. There is no evidence from breeding that they ever do so; on the contrary, all the evidence so far is the other way. I have bred many *L. Disippus*, and through many years. This is a three-brooded species here, and the caterpillars of the last brood make cases at either 2nd or 3rd moult, about two-thirds of them at 2nd. I have never known a caterpillar of any earlier brood stop at any stage and go into its case. But I have reason to know that L. *Ursula* behaves quite differently. I have myself never been able to get eggs of this species. It is common in our forest roads in June, but not common near my residence. After June

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there are but few examples anywhere to be seen, but so late as August and September, I have occasionally taken a ♀, never a ♂. In some years two or three, in others none. I have always confined these females for eggs, but have failed to get any. On dissection a few nearly matured eggs would be found imbedded in fat, and I had some time ago concluded that these eggs probably were not impregnated, as I had seen no late males.

But this last September, I received from Mr. Lewis Ullrich, of Tiffin, Ohio, several hibernating cases of *Ursula* and a chrysalis. Mr. Ullrich wrote me that on 26th Aug., he obtained from a female tied in a bag over a branch of apple tree 13 eggs, from which he got 11 larvæ. Of these, 6 went into cases when half grown, 1 died when ¾ grown, and 4 went to chrysalis. Two of the chrysalids produced females, and these Mr. Ullrich sent me. I dissected one of them, and could discover no signs of eggs. Certainly there were no eggs formed. The other female I sent to Mr. C. S. Minot, who has not reported on its condition.

This then accounts for the late examples of *Ursula* seen on the wing. Part of a brood may go into winter cases, while some go on to chrysalis and imago. But the existence of the species does not depend on these late, or September butterflies. Far from it! *Disippus* does not behave like *Ursula* in this respect, as observations show, and there is no evidence that *Arthemis* does. And yet, if any *Arthemis*, in any locality, are to be found flying in September, their presence may be accounted for by supposing that here and there a larva has passed the hibernating stage and gone on to butterfly, without there being a "second brood."

NEW SPECIES OF TINEIDÆ.

BY MARY E. MURTFELDT, KIRKWOOD, ST. LOUIS, MO.

GELECHIA CHAMBERSELLA.—In some notes on the larvæ of certain Tineids, published in Vol. vi., No. 12 of the CANADIAN ENTOMOLOGIST, I referred to an interesting species found on *Ambrosia artemesiæfolia*, which I proposed soon to describe under the above name. The description was indefinitely delayed by a vexatious accident by which I lost all my perfect specimens. For several succeeding years I searched in vain for

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the larvæ, and as the moth is not attracted by lamp-light, I began to despair of ever replacing the lost specimens. During the past summer, however, I was successful in taking several of the larvae, from which I obtained three imagines, and am thereby enabled to prepare the history of the insect for publication.

(My acknowledgments are here due to Mr. V. T. Chambers for the generic determination of this and the following species, and for much other assistance in my studies of this group of Micros. I am also indebted to Prof. O. S. Westcott, of Chicago, for valuable suggestions as to the selection and etymology of the names)

Imago: Alar expanse 0.35 inch, length 0.20 inch. General color of head and body cream-white, shading to buff on abdomen. Head variegated with fuscous scales; vertex roughened but scarcely tufted; palpi slightly exceeding the vertex, second joint brush-like, terminal joint smooth and slender; antennae rather short, dingy white, obscurely annulated with fuscous.

Ground color of primaries dingy white, thickly overlaid with fuscous scales arranged in eight or nine obscure vittae, most pronounced on apical third, with a more or less distinct fulvous spot on the outer edge of disk; outer margin dark; ciliae checkered white and fuscous. Secondaries silky, pale cinereous. Legs cream white, tibiae of hinder pair clothed with long, somewhat iridescent hairs; tarsi with fuscous annulations.

The larva inhabits a fusiform case formed by webbing together the slender divisions of the leaf, from which it eats the parenchyma of the upper surface, the latter being folded inside. Its average length is 0.35 inch; slender, cylindrical, sub-moniliform. Head small, polished, dark brown. The arrangement of colors on the body is striking and characteristic. First segment narrow, dark brown with small, transversely oblong, yellowish shield. Second and third and sixth and seventh segments velvety black or very dark brown, with conspicuous milk-white fold on posterior edge. Fourth and fifth segments uniform velvety black. Remaining segments similar with the addition of an oblique lateral white band on each anterior edge. Hairs fine, short and black. The larva makes several cases in the course of growth and changes to pupa within the last, enclosed in slight cocoon. The imago appears in July and early in September.

GELECHIA FORMOSELLA.—This species bears considerable resemblance to *G. maculimarginella* Cham., but is nearly one-half larger, the alar

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expanse being from 0.70 to 0.75 inch. The colors are also much deeper, more contrasted and somewhat differently disposed.

Face golden buff, vertex dark silvery, second joint of palpi pale ochreous dusted with brown, terminal joint very acute dark brown, antennae pale purple-brown.

Thorax and primaries dark slate gray with purplish reflections and variegated with small irregular ochreous and dark purple dots. There is a conspicuous purple spot on the costa at the outer edge of the basal third, and obliquely forward and below this a large irregular purple discal spot with minute ochreous dots on its inner margin. The outer one-third is entirely dark brown with purplish reflections brightened by a distinct costal streak of cream white and a similar opposite dorsal streak. Ciliae pale brown. Secondaries cinereous, shading to pale brown on costal edge. Abdomen same color. Legs pale ochreous variegated with brown.

The larva feeds on the Laurel Oak in May, rolling the leaves. It is of a pearl gray color ornamented with eight fine longitudinal purple or dull red lines. Head polished black. First segment narrow and constricted, corneous, black; second segment velvety chocolate brown edged anteriorly and posteriorly with white, third segment also edged anteriorly with white. Venter and prolegs translucent greenish white. Thoracic legs black. Pupa enclosed in slight cocoon within folded leaf. Imago appears about the middle of June. Rather rare.

GELECHIA CINERELLA.—The general color of this species is ochreous cinereous in all its parts. Head and thorax paler than the wings, inclining to cream color. Palpi simple, not exceeding the vertex. Primaries variegated with a few longitudinal fuscous streaks and a marginal row of minute black dots at the base of the ciliae. Alar expanse 0.45 to 0.50 inch. Length 0.20 inch.

The larva may be found during June and July mining and crumpling the edges of the leaves of the Horse Nettle (*Solanum carolinense*), causing them to turn brown as though seared by fire. Inside the puffy mine the larva forms and inhabits a tough silken gallery to which the frass is attached externally and upon which the edge of the leaf is gathered. The larva is cylindrical, rather thick and about one-third of an inch in length at maturity. It is of a translucent green color, the thoracic segments acquiring a blue tint after the last moult. Piliferous spots glassy, giving rise to short light hairs. Head and shield bright brown. When ready to transform it deserts its mine and forms a tough, oval cocoon on the sur-

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face of the earth. Imago appears in from twelve to fifteen days, and there are at least two successive broods.

GELECHIA BENEFICENTELLA.—Ground color of head, body and primaries pale buff or cream with ochreous shadings and a sparse dusting of blackish scales. Palpi exceeding the vertex, second joint thickened but smooth, terminal joint with two broad dusky bands. Primaries ornamented with numerous, rather indefinite maculae, of a blackish or dark steel gray color, producing on the light ground a somewhat checkered appearance. The dark color predominates toward the apex of the wing, and the outer border and ciliae are of the same dark shade. Secondaries broad, silky, cinereous with slight iridescence, ciliae a shade or two paler.

Legs cream color, dusted with blackish scales, tibiae of hinder pair densely tufted. Alar expanse from 0.70 to 0.75 inch.

The first brood of larvae may be found early in May folding the terminal leaves of *Solanum carolinense* into round, hollow balls, each of which forms the habitation of a single larva which feeds on the incipient flower buds and the infolded edges of the tender leaves. Length of larva from 0.50 to 0.60 inch, fusiform, greatest diameter 0.10. Color dull yellowish-green with dark-glaucous vesicular stripe. Head horizontal, cordate, about one-half the width of middle segments, black when young, later assuming an olive brown hue. Cervical shield corneous, rectangular, covering about two-thirds of the first segment, of an olive brown color. Piliferous plates minute, pale brown, each giving rise to a short light hair.

Pupa elongate, dark brown, without marked characteristics, suspended in the midst of a mass of fine, webby matter with which the mature larva fills its leafy domicile, an opening being also prepared through which the future moth can make its exit. Imago issues within two weeks. A second brood of larvæ soon follows.

The specific name for this insect was selected with reference to its services in the larva state, in preventing, to a considerable extent, the blossoming and fruiting of one of our most pernicious weeds.

LITHOCOLLETIS GREGARIELLA.—Ground color rich purple-brown with golden reflections. Two conspicuous golden-white fascia cross the basal and discal portions of the primaries. The apical one-third is ornamented with two white costal streaks and one dorsal streak opposite the inner costal one. Ciliæ dingy white. Secondaries very narrow, steel gray. Head purplish, iridescent, antennae dark purple conspicuously tipped with

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white. Expanse 0.15 to 0.18 inch. This species is closely allied to *L. desmodiella* Clem., but Mr. Chambers notes the points of difference as follows: "There is a shade of difference in the ground color, face not white as in *desmodiella*, though with a silvery or opalescent lustre; the dark margins of the fasciae and streaks are less distinct; it has no distinct dorsal mark opposite the costal one before the ciliae, and the apical part of the wing is not darker than the remainder; it is also a little larger than *desmodiella*."

The larva belongs to the cylindrical group, is of a whitish green color, and attains a length of about 0.14 inch. It mines the leaves of the Wild Bean *(Phaseolus pauciflorus)*. Its chief peculiarity is found in its gregarious habit, from five to fifteen imagines sometimes emerging from the large tentiform mine. The parent moth places her eggs here and there upon the under surface of the leaf, upon which the work of the young miners is soon apparent in the form of numerous minute blisters, which as they are enlarged, become confluent, and the congregated larvae soon devour every particle of the green tissue of the leaf, which puffs out into a cylinder. When mature the larvae construct in common a loose hammock-like web, within which they change to slender honey-yellow pupae. The imagines of the midsummer brood appear in twelve or fourteen days from the change to pupae. The second brood hibernates in the pupa state.

MR. SCUDDER'S "BUTTERFLIES."

BY S. H. PEABODY, CHAMPAIGN, ILL.

This long promised and lately issued book wants little that the skill of artizan or the genius of artist can furnish. The Entomological brotherhood—those lovers of the net and flask, who, gentler than the historic angler, impale not even a worm until it has become insensible to pain—they and the general public will find some store of delightful reading within its pages. Whether, as has been more than hinted, there are notable omissions of valuable matter observed and reported, and bearing with force upon topics treated therein, or not, there is enough of what Mr. Scudder has himself seen, to make the volume a valuable addition to the literature of Psyche.

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The fact that so many intelligent Entomologists have found themselves impelled to put on record their dissent from statements and theories found in this book, may, perhaps, be construed as a recognition of the high place which Mr. Scudder has held and still occupies as a scientific writer. The greater the authority borne by his words, the more earnest must be the protest of those who believe that in certain respects his utterances are misleading and mischievous. Reviewers in the New York Tribune, in the Nation, and elsewhere, have found in this work many points which invite trenchant criticism, in directions where the writer of this article does not care to follow. There remains, however, a topic upon which something should be said. We believe we shall be sustained by many of the foremost lepidopterists, when we express the opinion that this work is grieviously marred by a nomenclature that is singularly unscientific and confusing. If it shall appear that in the reproduction of this nomenclature, Mr. Scudder has acted not inadvertently, but in the face of positive and conclusive facts, which have demolished the foundation and razed the superstructure formerly constructed by him, then the terms by which we have characterized this nomenclature are not as explicit and as severe as they might well be made.

After Mr. Scudder had proposed his wholesale deformation of the nomenclature of American Butterflies, as published in his "Systematic Revision," in the Fourth Annual Report of the Peabody Academy of Sciences, we took occasion to review that Revision in the pages of the *Entomologist*. In that paper we attempted to show that the differences upon which, as criteria, Mr. Scudder had formed his new genera, even if, for argument's sake, these differences were admitted to be real, were not such as authorized the construction of new genera. As an example, applying the test of accurate and just comparison which every scientific discussion demands, we presented a tabulated statement of the characters of several of the proposed genera, collated from the printed diagnoses of these genera, and showing in parallel columns all the distinctions given. By this means we sought to show, as it seemed evident to ourselves, that the differences on which these genera were founded were both in fact and in statement evanescent and delusive, and not such as science could or should recognize as generic in their significance. We had prepared like synoptic tables of others of the proposed genera, and had found the innovations equally open to adverse criticism, but the specimen given seemed sufficient evidence of the quality of the whole. In the west, at

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least, grain is bought and sold by sample. Let it not be understood that we refer to this paper, its arguments, or its conclusions, as in any respect binding upon the opinions or expressions of Mr. Scudder. Upon the question of the value of the criteria referred to, there was room for great difference of opinion, and perhaps the points made might have been conclusively answered, even though no answer has been offered in the five years that have since glided into the past.

But the insuperable objection was yet to come, one which appears to be conclusively and finally fatal to the farther recognition of Mr. Scudder's new genera.

This objection was that the criteria on which the new genera had been constructed, the differences described in the ratios of tibiæ, the venation of wings, etc., when tested by careful measurement did not exist, as the constant and distinguishing differences between the genera which they had been said to designate. These measurements were made with great care and in large numbers by Mr. Theodore L. Mead, and were described by him in the columns of this magazine (Can. Ent. vii., 232–238). They showed that on the points specified the range of variation in well identified and indubitable specimens of the same species, was greater than, and included all, the variation that had been given as differentiating the genera. The question was no longer one of argument or of opinion, but of fact. We had argued that the differences, if existing, are not generic; Mr. Mead demonstrated that they did not exist, as constant in genera, but as found in individuals, or in species of the same genus. Facts, however stupid and senseless they may seem to him whose theories they oppose, are yet stubborn. No man who claims to recognize scientific truth can gainsay or deny them.

We claim, then, that Mr. Scudder's persistent use of his nomenclature in the face of these demonstrations is unscientific. Removed from a scientific basis, the system which subdivides genera without stint, which transfers specific names from genus to genus, which disturbs and inverts the familiar sequences of tribes, genera and species, becomes utterly and inextricably confusing. We are thankful that the well known, and well worn, cuts from Harris are again in service to show us bewildered mortals what familiar forms are signified by the unrecognized cognomens. We are also grateful for a catalogue in the appendix, where, as in a court calendar, we may learn what was the maiden name of the lady who has acquired a new title by wedlock or otherwise.

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Meanwhile we must express our sympathy for the "*Auctores*" who are so constantly quoted to be as constantly corrected. Poor fellows! They did know Lepidoptera so shockingly.

But Mr. Scudder does not seem to be content even with his own handiwork. Although he has cut a slice from a genus at this end, and a piece from that end, and a fragment out of the middle, and has given new names to pieces and relics alike, and in spite of swapping specific names, until they pass from hand to hand like soiled postal currency, he has yet a mission. He is seized with a certain Adamic afflatus, and begins the work afresh. Seated in his Eden he orders the Psyche phalanx to defile before him, and to each insect as it comes to a salute he presents a new name. Some are fairly suggestive; some on the principle of *Lucus a non lucendo;* some entirely fanciful; some singularly inapt; all unnecessary, and furnishing a still further element of confusion. Upon an erroneous assumption that *Danais Archippus* lives as an imago for a year and a half, it is dubbed the Monarch—certainly a ruler without a subject. If, as Mr. Edwards suggests, its longevity were proven, the insect might be called Patriarch; because of its wide and wandering range, we suggest that it were better with the name of Pilgrim, or possibly of Tramp. As the Monarch governs nobody, and *Limenitis Disippus* resembles him, no matter how, he must be Viceroy. Because the latter is tawny, and congeners are black, they are grouped as Purples. *Papilio Philenor*, which Say described—and Say had an eye for color—as black with green reflections, is called the Blue Swallow-tail. The genus once called Argynnis is broken up into several, but all receive the name Fritillaries. Diana remains Diana. Idalia becomes the Regal Fritillary; Cybele the Great Spangled Fritillary; Aphrodite the Silver-spot Fritillary; Atlantis the Mountain Silver-spot (not Fritillary); and Myrina is the Silver-bordered Fritillary. And so on to the end of the flitting, fluttering train.

Now, in the name of science, we seriously and earnestly protest against all this. Nearly every branch of natural history is cursed with a series of trivial or common names, which having no definiteness nor certainty of application, stand in the way of those which are accurate and significant. Birds, fishes, reptiles, plants have different names in localities not farther removed than adjacent counties, and one is always uncertain as to the species which is indicated. The scheme of Linnean nomenclature was devised to remedy this evil. English Entomologists have suffered their science to bear the burden of a double system of names,

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and it has been an occasion of devout thankfulness that no attempt has been made until lately to import the " common " ones within our borders. Their introduction, if successful, will be found a blunder surpassed in atrocity only by the introduction of the English Sparrow.

With grim sarcasm, the Tribune says : " A sufficient reason why these terms [the proposed 'common' names] should be fixed and permanently adopted is found in the fact that the scientific nomenclatnre is so variable, fluctuating constantly as one system of classification supersedes another. The practice of Mr. Scudder illustrates this confusion. Five new genera now take the place of Papilio, while that name has been transferred to a subdivision of what has been called the genus Vanessa. Specific names are shifted with the same freedom. Under the circumstances common names will be found of great value in indicating what particular butterfly is meant, just as scientific names are used in Botany to identify any plant which is spoken of under one or another of its more popular names."

As if, after dear little Buttercup had "mixed those children up," she had proceeded to solve the problem of their misplaced identities by giving them a new set of names. Or, since Mr. Scudder has introduced into the nomenclature of our butterflies a confusion as complete as it is ingenious, he now deserves great credit for leading us out of this maze of his creation by way of a series of new names, freshly devised for the occasion.

BOOK NOTICES.

Papilio :

This valuable monthly serial, devoted entirely to Lepidoptera, has now reached its ninth number, with an average of about 20 pages per number. It is the organ of the New York Entomological Club, is well got up as to printing and paper, and is edited by the Secretary of the Club, Mr. Henry Edwards. A large portion of its space is devoted to descriptive Entomology, with occasional papers relating to the life history of species. In the September number, among other interesting papers, we find one by W. H. Edwards on the alleged abnormal peculiarities of *Argynnis myrina*, which was read before the Subsection of Entomology at the recent meeting of the American Association at Cincinnati. In this paper the author shows from records of careful observation that many of the remarkable statements made by Mr. Scudder on the abnormal peculi-

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arities of this insect are incorrect. In the October number is a full description of the preparatory stages of *Thecla Henrici* by the same author; notes on an Aquatic Noctuid Larva, by J. H. Comstock, and descriptive papers by A. R. Grote, B. Neumoegen and Henry Edwards.

Bulletin No. 6, from the Department of the Interior, U. S. Entomological Commission, being a General Index and Supplement to the Nine Reports of the Insects of Missouri. By C. V. Riley; 8vo., pp. 177:

This useful pamphlet will add much to the value of the Missouri Reports, containing as it does a very complete index to all the matters contained therein. Following the introduction we have tables of the contents of the nine reports, then a list of errata, followed by a few pages of notes and additions; then follow descriptions of new species, descriptions of adolescent states, lists of illustrations, a copious general index and an index to plants and food plants.

On the Genera of Carabidæ, with Special Reference to the Fauna of Boreal America. By George H. Horn, M. D. From the Transactions of the Amer. Ent. Society, October, 1881, 105 pp., with eight plates:

In this paper the author dwells at some length on the value of the modifications of various organs of the body in the Carabidæ, for the purposes of classification, following with a complete classificatton of the tribes in this order, the points of difference being illustrated by examples in the excellent plates which accompany the text. Throughout this work there are many tables wherein the main points of difference are grouped in such a manner as to enable the student to readily recognise the many genera into which our numerous species are divided. This addition to our Entomological literature will prove a great help to Coleopterists, and only those who know the extent of this subject will be able to estimate the amount of labor and careful study required to produce such a work as that we have before us.

The Honey Ants and the Occident Ants. By Henry C. McCook, D. D.; 8vo., pp. 188, illustrated with thirteen plates, 1882:

This work, in the words of the author, is "a monograph of the architecture and habits of the honey-bearing ant, *Myrmecocystus melliger*, with

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notes upon the anatomy and physiology of the alimentary canal; together with a natural history of the occident harvesting ants or stone-mound builders of the American plains." It is written in a charming and popular style, and the details of the curious habits of these interesting creatures are given in such a manner as to show that the author has studied them closely and is quite familiar with every aspect of the subject treated of, while the beautiful illustrations are a material aid towards the ready comprehension of the whole matter. This work is well worthy of a place in the library of every student of nature.

A MANUAL OF INJURIOUS INSECTS, *with Methods of Prevention and Remedy for their Attacks to Food Crops, Forest Trees and Fruit, and with a short Introduction to Entomology.* By Eleanor A. Ormerod, F. M. S., London, England, 1881:

It is with very great pleasure that we draw attention to Miss Ormerod's excellent work on Injurious Insects—the full title of which we have given above. It is the first effort that has been made in England to bring within the reach and comprehension of ordinary farmers and gardeners a complete account of the insect enemies that they have to deal with. The work begins with an introduction to Entomology, in which the reader is furnished with an account of the general life-history of insects during the various stages of their existence, beginning with the egg and going on through the larva and pupa to the imago. This is followed by a sketch of the classification of insects, based upon Prof. Westwood's division into thirteen orders, each of which is represented by wood-cuts of common species in order that it may be easily recognised by the reader. The book is divided into three parts, viz., Food Crops, Forest Trees and Fruit, with the insects that injure them respectively. In each part the various crops, trees, &c., are treated of as regards their insect enemies, in alphabetical order; for instance, the "Food Crops" begin with the Asparagus, Bean, etc., and end with Turnips, thus making it very easy to obtain information about any insect that happens to be prevalent. Every insect treated of in the book is made easily recognisable to the non-scientific reader by means of admirable wood-cuts, partly the work of the talented authoress herself, and partly reproductions of the beautiful illustrations in Curtis' Farm Insects. Each cut shows the insect in the various stages of its existence, while the letter-press gives an account of its life history. As

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an example of Miss Ormerod's work we give two illustrations, selected almost at random :

P. 1—Asparagus Beetle, *Crioceris asparagi* Linn. (fig. 14).

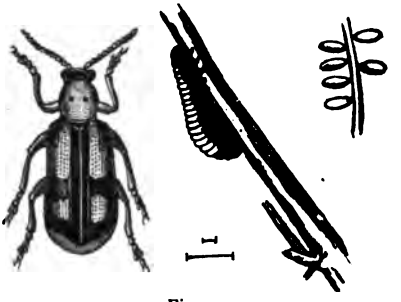

Fig. 14.

Asparagus Beetle, larva and egg ; all magnified. Natural length of egg and beetle shown by lines.

P. 123—Onion Fly, *Anthomyia ceparum* Bouché (fig. 15).

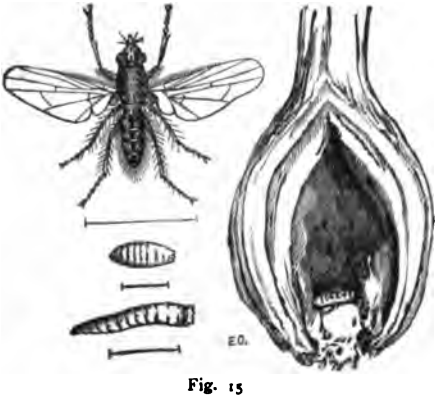

Fig. 15

Onion Fly, pupa and larva, all magnified. Onion-bulb showing pupa remaining in stored onion.

We cannot but congratulate Miss Ormerod upon the skillful manner in which she has accomplished her task, and we trust that her work will be fully appreciated by the farmers and gardeners of Great Britain, for whose special benefit it has been produced. The whole book is written in clear, simple language, free from all scientific terms and technicalities so far as they can be omitted, while the modes of prevention are such as have been

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practically tested by competent persons, and cannot fail to be beneficial if intelligently followed. We hope to see many editions of the work called for, and to learn that the authoress has been amply rewarded for her labor of love.—[C. J. S. B.

Reports of the U. S. Commissioner of Agriculture for 1878 and 1879:

We have lately received copies of both of these valuable reports from the Department of Agriculture at Washington. There are in them, in addition to all the other useful papers on subjects relating to agriculture in the reports of the Entomologist of the Dept., much that is of great interest to Entomologists. In the report for 1878 we have, from the pen of C. V. Riley, Contributions on the Insects Injurious to the Cotton Plant; the Silk Worm, with Instructions for the Production of Silk; with descriptions also of a number of insects injurious to field crops and fruits, occupying in all fifty pages, and illustrated by seven full-page plates. In 1879, papers by J. H. Comstock on the Army Worm, Clover Insects, Insects Injurious to Orange Trees, and many other species which injure field crops, fruit and forest trees, occupying in all 75 pages, and illustrated by six full-page plates. This volume also contains an extensive report on insects injurious to the cotton plant, 84 pp., with 9 plates.

Ottawa Field Naturalists' Club:

The second volume of the transactions of this active body of naturalists is at hand. It is a neat pamphlet of 44 pages, 8vo., with one excellent plate illustrating a new species of *Porocrinus* from the Trenton lime stone, accompanied by a description, with some remarks on the genus by Dr. James Grant. In addition to the annual report of the Club, the volume contains the inaugural address of the talented President, James Fletcher, Esq.; a paper "On some Coleoptera Injurious to our Pines," by W. H. Harrington; one by Prof. J. Macoun, "On the Capabilities of the Prairie Lands of the Great North-west, as shown by their Fauna and Flora," and other interesting contributions. We congratulate our Ottawa friends on the good work they have done this year, and sincerely hope that their active efforts may have the effect of promoting a general love for natural history among the residents of the capital of our Dominion.

North American Moths, with a Preliminary Catalogue of Species of Hadena and Polia. By A. R. Grote, 8vo., 20 pp.; from the Bulletin of the Geological and Geographical Survey of the U. S., Vol. 6, No. 2:

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In addition to the catalogues, this paper contains descriptions of twenty-eight new species.

The Insects of the Clover Plant. By J. A. Lintner, 8vo., 17 pp., with six cuts :

This excellent paper forms part of the fortieth annual report of the New York State Agricultural Society, and contains detailed descriptions of the insects most destructive to clover, with references to all the species known to feed on this plant.

PERSONAL.

It will interest our readers to know that our eminent American Coleopterist, Dr. John L. LeConte, of Philadelphia, has recently been elected an honorary member of the Deutsche Entomologische Gesellschaft. The number of members of that grade seems very restricted, for there are but seven others in the last catalogue, of whom the venerable Westwood is the only English-speaking one.

Mr. B. Pickman Mann, late of Cambridge, Mass., and so well known as editor of Psyche, has been appointed assistant Entomologist at the Department of Agriculture, Washington. His many correspondents will please bear in mind that his address in future will be Dept. of Agriculture, Washington.

Mr. K. L. Bramson, Member of the Imperial Society of Naturalists, of Moscow, who resides at Exaterinoslaw, Russia, desires to procure specimens of American Diurnal Lepidoptera, for which he offers in exchange European Coleoptera, Hymenoptera, Diptera and Lepidoptera. He has sent a list of his duplicates to the editor, who will be glad to send it to any one who may wish to make exchanges with this European Entomologist.

We have lately been favored with two letters from one of the founders of our Entomological Society of Ontario, Prof. H. Croft, formerly of Toronto, but now engaged in sheep farming in Texas, with his son, at Hermanitas Ranch, San Diego, Duval County. His many entomological friends will be glad to learn that he has carried his enthusiasm for natural history, and especially for insects, with him to his new home, and has promised shortly to send a communication on some of the Texan insects

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for the ENTOMOLOGIST. He speaks enthusiastically of the many beautiful butterflies to be seen on the wing in that southern latitude, and refers also to some diabolical Hymenoptera, the females of which are wingless, that sting horribly; of another large species which kills and carries off the Tarantula, and other interesting insects. He says: "During the summer we had thousands of *Elater noctileucus*, also quantities of *Lampyrus;* the light of the former is much more blue, brilliant and persistent."

OBITUARY.

It becomes our sad duty to record the death of one of our much esteemed fellow-laborers in the Entomological field, J. D. Putnam, of Davenport, Iowa. Mr. Putnam had long taken an active interest in the Davenport Academy of Natural Sciences, and had for some time past held the position of President of that active association of naturalists. He was with us at our late meeting in Cincinnati, and took part in the proceedings of our Entomological meetings, where his uniformly courteous, affable and gentlemanly bearing endeared him to all who had the opportunity of forming his acquaintance. Notwithstanding that he has been for some years in delicate health, he has written some valuable papers on Entomology and Mineralogy. His removal will be deeply regretted by all who have been privileged to know him, and particularly will he be missed by those with whom he has labored in the Academy at Davenport. When parting in Cincinnati we had sincerely hoped to meet again, but it has been otherwise ordered; he has been taken from a noble field of labor below, to, we trust, a nobler one above.

CORRESPONDENCE.

DEAR SIR,—

I have lately received a specimen of *Macrosila cingulata* Fab., captured at Long Point. It is about the dimensions of a medium-sized *quinquemaculata.* The spots on the body pink, and a pink patch on the hind wing. I see in connection with it that it feeds on the Sweet Potato, indicating that it was originally a more southern species.

J. ALSTON MOFFAT, Hamilton, Ont.

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The Canadian Entomologist.

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ENTOMOLOGY FOR BEGINNERS.

THE SOUTHERN CABBAGE BUTTERFLY—Pieris protodice.

BY THE EDITOR.

In figure 1 we have represented the male, and in figure 2 the female of the Southern Cabbage Butterfly, an insect by no means confined to the South, although much more abundant there than in the more northerly portions of America. This insect enjoys a wide geographical distribution, extending south-west as far as Texas, west to Missouri, north-west to the Red River, and along the east from Connecticut to the Southern Atlantic States. A few years ago it was not uncommon around London, and occasionally quite plentiful about the shore of Lake Erie at Port Stanley; but of late years it has become a rare insect with us, and we have not met with a specimen on the wing for several years. The English Cabbage Butterfly, *Pieris rapæ*, seems to have taken its place entirely.

Fig. 1.

Fig. 2.

The butterfly is a very pretty one, as will be seen by the figures. The ground color in both sexes is white, with black spots and black and dusky markings which are much more numerous in the female than in the male. Although so rare in Ontario that it has never, as far as we know, been reported as injurious, it is frequently very destructive to the south of us. According to Mr. Riley,

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it is abundant in Missouri, and often proves exceedingly injurious, sometimes destroying in a single district thousands of dollars worth of cabbages.

The caterpillar, when full grown (figure 3, *a*), is about an inch and a quarter long, of a bluish-green color, with four longitudinal yellow stripes and many black dots; when first hatched it is of an orange color with a black head. The chrysalis, shown at *b* in the figure, is about seven-tenths of an inch long, of a light bluish-grey color speckled with black, with the ridges and prominences edged with buff or flesh-color, and having larger black dots.

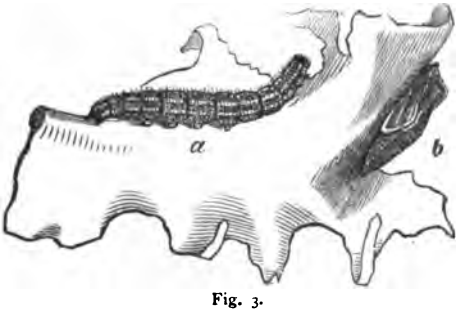

Fig. 3.

The insect hybernates in the chrysalis state, and where common may be found on the wing during the months of July, August and September.

DESCRIPTIONS OF TWO NEW SPECIES OF N. AMERICAN BUTTERFLIES.

BY W. H. EDWARDS, COALBURGH, W. VA.

CHIONOBAS VARUNA.

Male.—Expands 1.6 to 1.75 inch.

Upper side brown, individuals varying from yellow to red and black-brown, but in the examples under view red predominates; costal edge of primaries dark brown, next base dusted with white; apex and hind margin edged with dark brown, which fades insensibly into the ground color; beyond the disk, one to four small black ocelli; where one only is present, it is on the upper discoidal interspace; where two, the second is on lower median interspace; where all are present, the two extreme are large and about equal in size, the interior pair minute.

Secondaries have a narrow brown border, clearly defined on inner side; all the nervures and branches edged with dark scales; the ocelli

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are from nil to five, small, black ; when all are present they stand one on each interspace from subcostal to lower median ; fringes of primaries mixed light and dark brown, of secondaries mostly light.

Under side of primaries paler, the tint varying as above ; over costa, apex and over hind margin to the ocelli, sprinkled with light brown and white ; in some examples the white disappears below median nervure ; in the cell the brown lies in transverse streaks, and near the outer end are two whitish patches ; along the edge of hind margin a white dot in each interspace ; the ocelli repeated, enlarged and pupilled with white ; in one example, which has but one ocellus above, there are three below, one being on second discoidal, the other on second median interspace.

Secondaries light and dark brown and white, or almost wholly dark brown ; the basal area often dark to middle of cell, in sub-concentric curves about base, intermingled with streaks of white, but in other cases is nearly solid dark brown ; across disk a narrow dark band, the outer side well defined, the basal side not so distinctly, as the curved stripes, or the basal color, tend to coalesce with it ; but when most distinct this inner side is pretty evenly excavated ; on the outer side there is a rounded prominence opposite cell, posterior to which the outline is wavy to inner margin, and anterior there is a single curve to costa ; this band is dark brown upon both edges, and in some examples is wholly dark, in others it is lighter colored within, and with a little white ; beyond the band, the ground is either white, thickly dusted and streaked with brown, most so along the line of the ocelli ; or wholly uniform dark brown with a little dusting of white ; along the margin white dots like those of primaries ; the ocelli are five, nearly equal and pupilled white ; in one they are minute and the spot next outer angle is wanting.

Body black-brown ; below, thorax black, abdomen gray-brown ; legs light brown, with gray ; palpi brown with black hairs ; antennæ fuscous above, dull white below ; club orange below and at tip.

Female.—Expands 1.8 to 1.9 inch.

Closely like the male, the color varying in same manner ; the marginal borders are both distinctly cut on inner side ; the ocelli on primaries run from two to four, on secondaries are five, all usually blind, but sometimes the anterior ocellus on primaries and the second and fifth on secondaries have white pupils.

Under side as in male ; white dots along both margins as in the male.

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From 6 ♂, 4 ♀, taken by Mr. Morrison on the plains of Dacotah Terr., May, 1881.

Varuna belongs to same sub-group with *Uhleri*, Reak.; the fore wings, especially of the male, being narrow and produced. On the under side *Uhleri* is very white. Mr. Reakirt described the hind wings as "marbled with irregular markings of white, black and brownish scales, sometimes congregated into spots; at others, disposed in transverse lines, the darkest portions nearest the base, the color decreasing outwards; the waves from the outer border of the transverse band (up to base) are so interlaced and contiguous as to preclude all possibility of tracing any inner outline to this band; this outer is more distinct, yet not nearly so well or clearly defined as in the allied species; the reticulations appear to be diffused over the whole surface."

This description was made from a single pair taken by the late Mr. James Ridings, on Pike's Peak, in 1864, and late in the year, as to my knowledge, Mr. Ridings did not begin to collect before last of August or September. The expanse of the ♂ is given as 1.75 inch, the ♀, 1.69. Since that date many examples have been brought in, and the species is not uncommon in collections. It varies greatly. I have 11 ♂, 3 ♀, in my own collection. All are larger than Mr. Reakirt's specimens seem to have been, the smallest ♂ expanding 1.7 inch, the largest 2.05. The average expanse of the 11 is 1.88 inch. The females expand 2.1, 2.15, 2.2, averaging 2.15 inch. On the other hand, my *Varuna* males run from 1.6 to 1.75, averaging 1.7 inch; and the females average 1.88. *Varuna* therefore is considerably the smaller of the two.

It is also darker colored on upper surface, being red-brown most often, less commonly yellowish, while *Uhleri* is pale yellow-brown, and sometimes decidedly whitish—though I have one which is red-brown, plainly an exceptional case, as out of many which have passed through my hands, this was saved as the only dark one.

In the ocelli, their number and shape, the two species are alike.

On the under side, *Uhleri* is white, that being the predominating color on the hind wings especially. In 6 ♂, there is no trace of a band, the brown waves, as Reakirt calls them, being distributed pretty evenly over the whole surface, sometimes much broken, or macular; in one of these the brown is almost obsolete, and the surface is white with some fine streaks and a dusting of brown. In 5 ♂, there is a concentration of the waves upon the disk and basal area so as to give an indistinct band, the

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brown and white being interlaced in about equal proportions. If anything, the white predominates from the outer edge of the band to base; in 2 of the 5, while the band is thus outlined, all the rest of the wing to hind margin is white flecked with fine streaks or dusted.

The 3 ♀ are yellow above, two of them with less white below than any of the males; the other has the macular surface and no band. Of the two, one has the area from base to outer side of the band evenly reticulated brown and white, and the other is macular over the same area; so that in neither is there an inner side to the band. Wherever in both sexes there is an approach to a band, it is very unlike the dark band usually seen in this genus. In all the *Varuna*, also, there are distinct white points on both hind margins on under side, and I find nothing of this in *Uhleri*.

Mr. Morrison writes: "This Chionobas was taken in Dacotah Terr., on my way to Montana, in May. It was found on the plains, elevation about 1,200 feet, and in all about 100 specimens were taken. All the *Uhleri* I have taken were in mountains, never at less than 5,000 feet elevation, and from that to 11,000 feet, and only in July and August."

Mr. A. G. Butler, Cat. of Satyridæ in B. Mus. Col., 1868, gave Chionobas (Oeneis) *Tarpeia*, Esper., Eu. Schmett., pl. 83, as belonging to Arctic America. It has occurred to me that the form I call *Varuna* might be that which Mr. Butler had in view. Esper's figure represents a species shaped, colored above, and ocellated after the manner of *Uhleri*, but I should not take the under side to be that of any of the American forms. But the figures are too coarsely done to enable small differences to be distinguished. The butterfly *Tarpeia* I have not seen.

ANCYLOXYPHA LENA.

Male.—Expands 1.1 inch.

Upper side dark brown, glossy; primaries have three small white spots, with traces of a fourth, in an oblique bar from costa, at four fifths the distance from base to apex; a small spot in cell near outer end; and three minute spots in median and submedian interspaces, two being in the latter, these about three fifths the distance from base to hind margin. Secondaries immaculate. Fringes concolored.

Under side of primaries dark brown, grayish at base and over apical area, more particularly when seen obliquely. Secondaries gray-brown, caused by a uniform sprinkling of whitish scales over the brown surface;

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without spot except a transverse abbreviated white dash on middle of disk.

Female.—Expands 1.15 inch; color of the male; the white spots conspicuous, forming a discal row quite across primaries; a large spot in cell, and a small one in submedian interspace near base. Under side of both wings as in the male, except that the three costal spots of discal row are repeated, and the spot in cell, but all are reduced.

From 1 ♂, 1 ♀, taken in Montana by Mr. Morrison, 1881. In all 4 examples were taken.

LIST OF BUTTERFLIES TAKEN BY H. K. MORRISON IN DACOTAH AND MONTANA, 1881.

Papilio Zolicaon, Bois.
Pieris Protodice, Bois.
Colias Philodice, Godt.
" Eurytheme.
form Keewaydin, Edw.
Argynnis Cybele, Fab.
" Aphrodite, Fab.
" Nevadensis, Edw.
" Edwardsii, Reak.
" Myrina, Cram.
Euptoieta Claudia, Cram.
Melitaea Acastus, Edw.
Phyciodes Carlota, Reak.
" Tharos, Drury.
Limenitis Weidemeyerii, Edw.
" Disippus, Godt.
Coenonympha Inornata, Edw.
Satyrus Nephele, v. Olympus, Edw
" Meadii, Edw.
" Charon, Edw.
" Silvestris, Edw.
Chionobas Varuna, Edw.
Thecla Humuli, Harr.
" Strigosa, Harr.
Thecla Acadica, Edw.
" Smilacis, Bois.
" Titus, Fab.
Chrysophanus Dione, Scud.
" Helioides, Bois.
" Rubidus, Edw.
Lycaena Saepiolus, Bois.
" Lupini, Bois.
" Melissa, Edw.
" Aemon, West.-Doubl.
" Pseudargiolus, Bois.
form Violacea, Edw.
" Comyntas, Godt.
Ancyloxypha Lena, Edw.
Thymelicus Poweschiek, Parker.
Pamphila Pawnee, Dodge.
" Uncas, Edw.
" Cernes, Bois.
" Metacomet, Harr.
" Delaware, Edw.
Amblyscirtes Vialis, Edw.
Pyrgus Tessellata, Scud.
" Scriptura, Bois.
Thanaos Persius, Scud.

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FIELD NOTES—1881.

BY W. H. HARRINGTON, OTTAWA, ONT.

The earth covered by its first mantle of snow reminds one that the collecting season is virtually ended, and the lengthening evenings allure one to the study fireside to go carefully over note books and collections and to read the recorded labors of fellow Entomologists.

A few memoranda from my own note book may perhaps not be barren of interest to some of the less experienced readers of the ENTOMOLOGIST. I find that almost the first insect of spring was the Mud-wasp, *Polestes annulatus*, which appeared with a few flies and spiders about the 15th of March. This wasp is very abundant here, and from the pulverized macadam of the streets thousands of its mud cells are constructed every summer under the window-sills and numerous cornices of the Parliament Buildings, about which the wasps linger until the end of October. Toward the end of March a few bees and a number of small beetles, as *Amara interstitialis*, appeared. *Pieris rapæ*, the cabbage butterfly, was observed on April 1st, but from this date to the 8th of the month a severe cold spell (thermometer touching zero) reduced insect appearances to the minimum again. At its conclusion they emerged in still greater variety and number; *Vanessa antiopa* flitted about in sunny glades of the wood; *Cicindela purpurea* enlivened the fields, and its relatives, *C. vulgaris* and *C. sex-guttata*, the roads. Mosquitoes came in full force a fortnight later, and on the 24th I obtained a number of Buprestidæ upon young pines, viz., 1 ♂ and 2 ♀ *C. virginiensis*, and 14 ♂ and 13 ♀ *C. liberta*. I was somewhat surprised to find them so early in the year, yet could have taken many more. They were generally paired, in several instances copulating. Some *Pissodes* were also seen, and these were with few exceptions copulating. Great numbers of Saw-flies were also upon the pines. A few days later I captured specimens of *A. striata*, and by the beginning of May all orders of insects were well represented. On the 6th *Serica sericea* was abundant on the foliage of wild gooseberry bushes. *Chrysomela elegans* was also unusually numerous, but I could not find upon what it fed. *Platycerus quercus?* was found eating the buds of maples and other trees. The buds were often completely eaten out, and the beetles hidden from view therein. In some buds a male and female were found copulating. This beetle was new to my collection, but I found them frequently again

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during the summer when using a beating net. During May the curious larvæ of certain Lampyridæ were often seen in damp woods, crawling on the trunks of trees, such as cedar, or affixed by the tail to the bark, undergoing their metamorphoses in a similar manner to the larvæ of the Coccinellidæ. Some reared at home emerged as *Photinus angulatus*. The larvæ, and to a less degree, the pupæ, emitted a strong greenish glow from two of the posterior segments; the imago being, of course, one of our common "fire flies." Some of the larvæ were thickly covered beneath with small ticks, of a bright vermilion color, which had their pointed heads plunged between the armored segments of the larvæ. They were not easily dislodged, but walked rapidly when free. By these little parasites the larvæ were so weakened as to perish before completing their transformations. The warm weather of mid-May brought forth increased hosts of insects, and the sultry air, especially in the neighborhood of lumber yards, swarmed with Scolytidæ, etc. Toward the end of the month I took a trip, with three friends, to the Wakefield Cave, about twenty miles north of the city; and in my spare moments collected a number of insects in that vicinity. Cicindelidæ especially abounded on the sandy hill-side roads, and I captured three species which are rare, or not found about here, viz., *C. 12-guttata*, *C. longilabris* and *C. limbalis*. On my way back I took a specimen of *C. sex-guttata* having only two spots (the anterior one on each elytron). Although called Six-spotted Tiger Beetles, very many have eight spots, and specimens with ten spots are frequently taken. In a beech grove at Chelsea, *Ithycerus curculionides* was very abundant; several could be seen on nearly every tree; many pairs were copulating. Where do the larvæ live? On the 31st of May several specimens of *C. Harrisii* were taken on pine saplings, and *H. pales* and its long-snouted relatives were in full force. On June 4th, *Saperda vestita*, *Oberea amabilis*, *B. nasicus*, *C. nenuphar*, *A. quadrigibbus*, and many other weevils, elaters, etc., were noted. At an excursion of the Ottawa Field Naturalists' Club to Montebello (45 miles down the river), on 26th June, I captured 129 species of Coleoptera, a considerable percentage of which were new to me. Carabidæ were particularly abundant under drift-wood and dead leaves on the damp, shady shore, and 35 species were taken. Chrysomelidæ, Elateridæ and Curculionidae were next in number with 15, 13 and 13 species respectively. After midsummer my opportunities for collecting were few, and my notes correspondingly scanty. I will merely mention the capture at Aylmer and Hull, on Oct. 2nd, of *Aletia*

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argentata, the cotton moth; both specimens were in perfect order, not in the least rubbed or worn. In Oct., 1880, I took several specimens about the city, also apparently recently emerged.

TWO NEW SPECIES OF ISOSOMA.

BY G. H. FRENCH, CARBONDALE, ILL.

ISOSOMA ALLYNII, n. s.

Female.—Average length .10 of an inch. Color of body and antennæ uniform black, the first with a slight greenish lustre. Head about .025 of an inch wide, about two thirds as long; the antennæ a little enlarged at the ends, hairy, microscopic hairs moderately scattered over the head and thorax. Thorax, as well as head, punctured; wings hyaline, dotted over with microscopic hairs, the thorax in its widest part about the width of the head. Abdomen gradually tapering from near the base, the ovipositor slightly exserted. The color of the legs vary slightly; in five specimens the anterior and posterior legs have the femurs fuscous except at the ends; the tibiæ with basal half fuscous, the rest yellow; the terminal joint of tarsi fuscous, the rest yellow; the middle pair of legs are yellow throughout except the terminal tarsi. Two specimens have all the femurs fuscous, yellow at the ends. One specimen has all the femurs pale red, and the tibiæ fuscous, but this is probably a change from yellow by the poison bottle used in killing. One is marked like the first five, with the yellow replaced by pale red; another is like the first five, except that the middle tibiæ are a little clouded at base.

Male.—In this sex the body, wings and antennæ are colored like the females, but the antennæ are a little more slender at their ends. The head and thorax have about the same measurements, but the abdomen is a little shorter, the whole insect being from .06 to .07 of an inch. The legs have all the femurs yellow, front tibiæ yellow, middle and hind tibiæ fuscous, except at the apices, which are yellow; feet as in the females.

Larvae.—These are found inside stalks of growing wheat in Southern Illinois, before the ripening of the grain, and in the straw and stubble during the rest of the summer. They are found mostly in the interior of the first and second internodes below the one supporting the head, usually singly, but sometimes more than one in the same internode. They pro-

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duce no swelling or gall, as do the larvæ of *I. Hordei*, but feed upon the soft tissue of the interior of the stalks. They are about .15 of an inch long, rather slender, tapering slightly toward either end, footless, but when in motion seeming to have the power of pushing out the substigmatal portion of the segments, a distinct transverse head about two thirds the width of body, with a pair of brown jaws. Color yellow, approaching a pale orange.

Pupae.—These vary from about .08 to .12 of an inch long, are black and of the usual hymenopterous form. About four fifths of the larvæ observed changed to pupæ and produced the imago, or died, the past season from July 20th, when the first imago was found, to August 20th, or perhaps better, underwent their changes between July 8th and August 20th; but I think this the effect of the dry season. Those examined the last of November were in the pupa state in the interior of the stalks down close to or in the substance of the joint, both in the fields and in my breeding jars. Those were in the larva state the last of August. It is probable they pass the winter in the pupa state under ordinary circumstances to produce the imagines in the spring, and that those hatching during July and August perish without ovipositing.

Described from 10 females and 4 males.

I take pleasure in dedicating this species to Robt. Allyn, LL.D., President of the Southern Illinois Normal University, as a slight acknowledgment of valuable aid and encouragement he has rendered me in my work.

ISOSOMA ELYMI, n. s.

Length .07 of an inch. A little more slender than the preceding; width of head and middle of thorax .02 of an inch. Color black without metallic lustre. Head and thorax very sparsely covered with hairs; antennæ scarcely enlarged at the ends; wings hyaline, microscopically hairy; legs rather more slender than in the preceding species, or in *I. Hordei*, all fuscous throughout, except that the joints are a little pale. Abdomen about as in the other species, the ovipositor slightly exserted.

Larvae.—These are found on the interior of the culms of *Elymus Canadensis* in about the middle internodes of the stalks, very much as the larvae of the preceding species are to be found on the interior of wheat culms. While, however, the wheat larvae are generally just above the joint, these may be found in any part of the interior of an internode.

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Both feed upon the soft tissue of the interior of the stalk, and do not produce any enlargement; the only noticeable effect from the outside is that internodes containing larvae are usually shorter than others. The larvae are footless, about .10 of an inch long when still, and 04. wide in the widest part, tapering to the extremities; the head transverse, about two thirds as wide as the body in its widest part, with two brown jaws. Color very pale yellow. Like the preceding, there appear to be slight projections from the sides of the body at times.

Pupa.—At the time of writing this, December 12th, all the specimens I have are in the larva state. A few went through with their transformations during the summer, but a much smaller number than of the preceding species. August 30th, two specimens of the imago were obtained from culms, having gnawed their holes of egress nearly large enough to emerge, but one was so injured in cutting open the stalk that it was not preserved. The form and color of pupa can only be guessed from the empty cases of those found in the culms.

Described from one female specimen found hatched in a stalk of *Elymus Canadensis*, August 30th, 1881.

THE OLDEST FIGURES OF NORTH AMERICAN INSECTS.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The Gazophylacium of Jacob Petiver, Apothecary in London (died 1715) is a very rare book, as the plates and the catalogues were printed and published at different times between 1695 and 1715. They were collected later and published by Mr. Empson, an officer of the British Museum and a natural son of Sir Hans Sloane, in 1764, in London, with the title, "Jacobi Petiveri Opera, etc., or Gazophylacium, 2 vol. fol." A small volume in 8vo contains the original sheets published by Petiver between 1695 and 1706. The library of the Museum of Comp. Zool. at Cambridge possesses a copy presented, June 1765 by Emanuel Mendez da Costa, Librarian of the Royal Society, to Thomas Knowlton. The collection of J. Petiver, at least the Lepidoptera, is still preserved in the British Museum, and was seen by me in 1857. Every butterfly is placed between two thin plates of mica, fastened with a small

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band of paper around the margin, and glued with one flying slip to the pages of a book in quarto, so that every species can be examined above and beneath.

Perhaps it is of some interest to know the names of the insects represented in the Gazophylacium, the more as many of them are quoted by Linnaeus. Some are well represented, many of the others recognizable.

Plate 2, figure 2. Buprestis rufipes? Maryland.
" 3, " 3. Neonympha eurytris. Maryland.
" 3, " 2. Deiopeia bella. Carolina.
" 6, " 6. Perhaps a Tenthredo. Carolina.
" 6, " 12. Limenitis spec.? Carolina.
" 7, " 6. Basket from Oiketicus. Carolina.
" 7, " 10. Colias caesonia. Carol.
" 10, " 4. Alaus oculatus. Virginia.
" 13, " 10. Mutilla spec. Virginia.
" 14, " 5. Actias luna. Maryland.
" 15, " 1 & 2. Libellula trimaculata, mas. fem. Maryl.
" " 9. Limenitis disippus. Carol.
" 17, " 2. Tortrix spec. Maryl.
" " 7. Callimorpha militaris var. contigua. Maryl.
" " 8. Callimorpha interrupto-marginata. Maryl.
" " 11. Disonycha glabrata. Maryl.
" " 12. Thyris lugubris. Maryl.
" 24, " 10. Strategus antaeus. Maryl.
" 25, " 11. Cerambycid? Carol.
" 26, " 11. Coleopteron? Maryl.
" 27, " 3. Clytus Robiniae. Maryl.
" " 7. Passalus interruptus. Maryl.
" " 8. Phanaeus carnifex. Maryl.
" 32, " 5. Eudamus Lycidas. Carol.
" " 7. Haemaris thisbe. Carol.
" 33, " 3. Epilachna borealis. Maryl.
" " 5. Vanessa Huntera. Maryl.
" " 11. Erebia Portlandia. Carol.
" " 9. Cicindela purpurea.
" 71, " 3. Lebia spec. Carol.
" " 4. Cassida spec. Carol.

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The second volume contains the Pterigraphia Americana on 20 plates (Ferns, Mushrooms, etc.), published perhaps 1708. There are many insects, mostly from the Antilles. But there are also a number of undoubtedly N. American insects among them.

Pl. 11, fig. 10. Pyrgota undata? 11. Dipteron. 12. Tabanus. 13. Musca. 14, 15. Mutilla.

Pl. 12, 11–15. Diptera.

Pl. 13, 1. Thalessa lunator. 2. Ophion. 3. Sirex. 4. Hymenopt.

Pl. 14, 8 & 10. Chauliodes serricornis. 9. Polystoechotes sticticus.

Pl. 15, 7. Chauliodes pectinicornis. 8 & 9. Diptera.

Pl. 20, 14. Longicorn beetle.

The much later work of Catesby figures only 17 insects from North America.

NOTES ON APHIDIDÆ.

BY JOSEPH MONELL, E. M., ST. LOUIS, MO.

APHIS LONICERÆ Monell. Riley & Monell, Notes on the Aphididæ, U. S. Geol. and Geogr. Survey, Vol. v., Jan., 1879, p. 6.

This species is the one mentioned by Prof. Thomas in the eighth Ill. Ent. Rept., p. 104, under the name of *Chaitophorus loniceræ* Mon'l Mss.

PHORODON MAHALEK Fonsc. This European species has been very abundant at the Missouri Botanical Gardens, St. Louis. I believe that it has not before been definitely reported as occurring in the United States.

CHAITOPHORUS SMITHIÆ Monell, l. c. p. 32.

Chaitophorus salicicola Thos. l. c.

CALLIPTERUS Koch.

Continued study of this genus has confirmed me in the opinion that the subdivision proposed by Passerini is impracticable. In this I am confirmed by Prof. Buckton in his valuable work on the British Aphides.

C. ULMIFOLII Monell, l. c. p. 29.

C. ulmicola Thos. l. c. p. 111.

C. (MYZOCALLIS) HYPERICI Thos.

This species was previously described by me as APHIS HYPERICI l. c,

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p. 25. This insect is a typical Aphis and lives in clusters. So far as I know, all Callipterus are sporadic in habit.

C. TRIFOLII n. sp.

Apterous individuals: Tuberculate; with capitate hairs.

Winged individuals: Dorsum without conspicuous tubercles. Third joint of antennæ twice as long as the fourth; fourth and fifth joints sub-equal; sixth and seventh joints sub-equal.

Wings: Marginal cell hyaline. Veins bordered with brown. Basal half of stigmal vein sub-obsolete and not thickened and dusky at base.

Length of body .04–.05, of wing .07, of antennæ .06 in. Clover leaves. June.

This species can be easily distinguished by the naked eye from *C. punctata*, by having the veins more robust, and shaded not only at tip but for their entire length.

The American species may be distinguished as follows. With regard to the species described by Fitch, see Riley & Monell, l. c. p. 28.

A. Dorsum of winged individuals with spine-like tubercles... *C. ulmifolii*
AA. Dorsum without spine-like tubercles.
a. Marginal cell dusky.
b. Middle tibiæ pale yellow. Femora pale yellow..... *C. Walshii*
bb. Tibiæ black. Apical portion of femora black..... *C. bella*
aa. Marginal cell hyaline.
b. Wings with transverse, shaded bands.
c. Abdomen with conspicuous dusky spots..... *C. discolor*
cc. Abdomen yellow, concolorous, or with very faint transverse bands.. *C. asclepiadis*
bb. Wings sub-hyaline.
c. Nectaries distinct.
d. Wings not hyaline.
e. Sixth joint of antennæ half as long as seventh.. *C. punctata*
ee. Sixth and seventh joints sub-equal..... *C. trifolii*
dd. Wings hyaline.
e. Apical joint of antennæ a little longer than the sixth, veins whitish.. *C. hyalinus*
ee. Apical joint of antennæ three times as long as the sixth. First and second discoidals black.... *C. betulaecolens*
cc. Nectaries not perceptible.

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d. Wings hyaline.....*C. caryae*
dd. Veins bordered with brown.....*C. quercicola*

COLOPHA COMPRESSA (Koch.)

Schizoneura compressa Koch. Pflzl. 1854.
Byrsocrypta ulmicola Fitch. Fourth N. Y. Rep't, 1858 §. 347.
Thelaxes ulmicola Walsh. Gen. Am. Aph. Proc. Phil. Ent. Soc. 1, 1862, p. 305.
American Entomologist, I, 1869, p. 224.
Colopha ulmicola Monell. C. E. ix, 1877, p. 102.
Glyphina ulmicola Thomas l. c. p. 142, 1879
Colopha compressa Lichtenstein. Les pucerons des ormeaux. Feuille des Jeunes Naturalistes, 1880.
American Entomologist, iii., p. 76, 1880.

This insect has been referred to six different genera. The synonymy of this species up to 1877 has been discussed in the C. E., ix., 102.

The genus Glyphina was insufficiently characterized by Koch. The species upon which it was founded, *G. Betulae*, is referred to the genus Vacuna by Passerini (1863), Walker (1870) and Kaltenbach (1874) under the name of *V. alni* Schrank.

Some doubts existed as to whether intermediate forms would not be found connecting Vacuna and Colopha, as it has been found that the number of joints in the antennæ sometimes vary (see Lichtenstein, Entom. Monthly Mag., March, 1880), but Prof. Riley, who has investigated this subject with his usual ability, has succeeded from biological evidence in establishing the right of Colopha to rank as a separate genus.

According to Mr. Lichtenstein, of Montpellier, the true female of Vacuna has a rostrum and lives about a month sucking at the leaves. In Colopha, on the other hand, the true female has a rudimentary mouth and dies with the egg in the body. Judging by analogy with Tetraneura, it is probable that the true female lives but for a few days. The validity of the genus Colopha is acknowledged by Lichtenstein, Kessler, Loew and Fr. Thomas, but all of these gentlemen concur in considering the European *S. compressa* Koch identical with the American *B. ulmicola* Fitch.

TETRANEURA Hartig.

Byrsocrypta Hal (in part), nec Walsh.
Antennæ short, six-jointed.

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Wings deflexed. Fore wings with four simple oblique veins. Hind wings with one oblique vein.

This genus has not been previously found in America. The only species known are *T. ulmi* Geoffr., *T. alba* Ratzb. and *T. rubra* Licht.

I have succeeded in raising *T. ulmi* at St. Louis from eggs sent to me by Mr. Kessler, of Cassel. They seemed to thrive the first season, but did not appear again the next year.

T. GRAMINIS n. sp.

Head and thorax dusky, abdomen dusky or sometimes of a greenish or yellowish tinge. Antennæ dusky, the third joint as long as the three following taken together; joints four and five equal; apical joint a little over half as long as the preceding. Wings hyaline. Subcostal of the hind wing comparatively straight.

Length of body .08, to tip of wings .12 in.

On leaves of *Aira caespitosa* and *Agrostis plumosa*, enveloped in a thick cotton-like secretion.

Sept.–Oct. St. Louis, Mo. Springfield, Mo. Neosho City, Mo.

PEMPHIGUS ACERIS n. sp.

Winged female: Head and thorax dusky, abdomen dusky, but appearing white from the abundant pulverulent matter. Antennæ long, slender; the apex of the fourth joint reaching the wing insertions; joints subcylindric, scarcely contracted at base, apical unguis not perceptible; fourth and fifth joints sub-equal, fourth joint not clavate, third joint less than the two preceding taken together.

Wings sub-hyaline, subcostal and oblique veins brownish black. Stigmal vein arising behind the middle of the stigma. Venation closely resembling that of *P. acerifolii*, except that the base of the first discoidal is usually more remote from that of the second discoidal. Length 0.12—0.15, to tip of wings 0.20—0.22 in. On the under side of limbs of Hard Maple, enveloped in woolly matter. Peoria, Ill. June (Miss E. A. Smith). A comparison of about fifty species, each, of *P. aceris* and *P. acerifolii*, shows that the antennal differences between the two are quite constant.

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ENTOMOLOGICAL NOTES FOR THE SUMMER OF 1881.

BY PROF. E. W. CLAYPOLE, YELLOW SPRINGS, O.

I came only last year on the premises where I am now residing, and though I had a small crop of cherries, they were so badly infested with the weevil *(Conotrachelus nenuphar)* that only a few quarts could be found free from the grub and fit for canning. This year a fair crop was promised, the spring was late and the danger of frost little. I proposed therefore to make war upon the enemy, and as soon as the blossom was over prepared a large sheet of cheese-cloth, and for about three weeks jarred the trees before breakfast almost every morning. As the result, I have now nearly 2,000 weevils peacefully reposing in a bottle, after a composing draught of benzine. Only about 10 per cent. of my cherries this year were unfit for use. I carried the war into the orchard, and simply by way of experiment, jarred some of the early apple trees and captured a great many of my enemies. I am more than repaid for my labors both on the cherry and apple trees by the quality of the apples, when last year, with a larger crop, I only obtained knotty, gnarly fruit. I have this year round, smooth, well-shaped apples. I have never heard that anything has been done, at least in this neighborhood, to trap the weevils on the apple trees. Those who live in the north have no idea of the mischief wrought here by the weevil in the orchards.

A word for the mole. In digging potatoes this year I observed the runs of a mole in all directions through the ground. It was a piece of old sod and very much infested with white worms, the larvæ of the Cockchafer *(Lachnosterna fusca)*. Many of the potatoes had been partly eaten by these worms, but I observed that wherever a mole-run traversed a hill of potatoes no white worm could be found, even though the half-eaten potatoes were proof of his former presence. The inference is fair that the mole had found him first and eaten him, and very likely the mole's object in so thickly tunnelling this piece of ground was to find these grubs.

Now it would be very easy to trump up a charge against the mole on the evidence of these facts. There was the "run" which nothing but a mole could make, and there were the gnawed potatoes; put the two together and kill the mole. Many a man has been punished on less conclusive circumstantial evidence. But it is perfectly easy to distinguish the work of a mole from that of a white worm, if one will only take the pains.

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I have many times found the latter coiled up in the potato he was eating, but I have never seen the mark of teeth such as the mole possesses on a potato. Nor do I believe the mole ever meddles with potatoes, or corn.

Abundance of Certain Insects.—The Southern Cabbage Butterfly *(P. protodice)* is exceedingly abundant here this summer. I have been able to count scores on the wing at one time.

The potato worm, or larva of *S. 5-maculata*, is troublesome on the late potatoes this month (September) and soon strips a plant of its leaves. However, he is easily dealt with, as he is at once betrayed by the castings on the ground, and a little "poison-dust," such as I use for the beetle, soon makes an end of him. I have tried "Buhach" on this insect, but find the former much easier of application and more effective. The latter diluted with ten parts of flour had little effect on the worms, but when used neat it stopped their feeding and killed two of them in a couple of days. But there is the trouble of looking up the creature (green on a green ground) in order to put the powder "where it will do the most good," whereas one need only shake the powder-tin over the plant and pass on, leaving the worm to poison itself.

The same is true of the Cabbage Butterfly *(P. rapæ)* in the early stages of growth of the cabbage. I have used Buhach, and a friend of mine is now using it on a plot of 3,000 heads of cabbage, but the time spent in finding the green worm on the green leaf is a serious drawback, and while the plant is very young I prefer using the "poison dust." I can sprinkle a whole bed while I am finding the worm on a dozen cabbage heads in order "to put salt on his tail." The "poison dust" to which I refer is made by mixing one part of London Purple and sixty parts of ashes and passing the mixture several times through a fine sieve. I may add that I find this a very efficient remedy for the turnip fly.

NEW MOTHS, CHIEFLY FROM ARIZONA.

BY A. R. GROTE.

(Continued from Vol. xiii., p. 229.)

HADENA IDONEA, n. s.

♂ ♀. This species is similar in size to *verbascoides* and *cariosa;* it is very like the latter only instead of reddish brown the color is of an ochrey brown, rather pale, the stigmata concolorous, rather wide, ill-

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defined, separated by the dark median shade. The claviform spot is open, and stretches across the median field nearly touching the even t. p. line. Lines geminate, marked on costa. A slight, irregular basal streak and one below it on internal margin. Terminal field dark shaded, obtaining twice, opposite cell and at internal angle. Fringes dark cut with pale. Hind wings very dark, with paler fringes, concolorous, an indication of discal mark ; beneath with faint double extra-mesial lines ; the narrow terminal space paler on both wings. The costa of fore wings is more or less pale. Abdomen tufted. This species is more ochrey than *vulgaris*. Texas, Kansas, Wisconsin.

HADENA AUREA, Grote.

This species may be known from all the other forms of *Pseudanarta* by the white discal (reniform) spot and the orange hind wings. A specimen from Arizona is a little larger than my type and the fore wings show indications of the t. p, and s. t. lines shaded with whitish and give the outer third of the wing a little the appearance of *flava*. The white discal spot of fore wings is repeated beneath and is probably a quick character of the species. The hind wings are bright orange above and below, without discal mark and with a moderate, even, black marginal band. My type from Texas has the fore wings a little rubbed. The Arizona specimen expands 21 mil. Coll. B. Neumoegen.

ONCOCNEMIS GRISEICOLLIS, n. s.

Allied to *atricoliaris* but smaller, the collar entirely whitish gray, head blackish. Eyes naked ; the short fore tibiae with a terminal claw. Gray, of a whitish tone. Under the glass the surface of primaries is whitish sparsely mixed with black scales. The markings hardly visible to naked eye. Under the glass the black, perpendicular, thread-like t. a. line is seen and attached to it a sub-rounded enclosed concolorous spot, the claviform. Similarly the concolorous orbicular and reniform may be seen ringed with fine black circles, the stigmata subequal, orbicular round, reniform upright, hour-glass shaped. Median space narrow ; t. p. line indicated. A black dash from the reniform outward tapering to external margin. Similar fine interspaceal shades give the terminal space a slightly rayed appearance. Hind wings whitish, sub-pellucid. Beneath pale. *Expanse* 25 mil. Arizona, coll. B. Neumoegen.

This makes the twenty-first species of this genus discovered in North America. The species is interesting as affording an ally to *atricollaris*.

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PYGARCTIA ABDOMINALIS.

This species described by me many years ago, from a specimen taken by me in Alabama, is, I now believe, wrongly placed. The type has been broken; only a pair of wings remain. I believe it to be a *Euchaetes*, not since taken. The fore wings are of the same dark color as *egle* and *Spraguei*, but there is a distinct dark yellow costal vitta. The species will easily be recognised from the description, with its reference to *Euchaetes*. The median vein of secondaries is 4-branched, 3, 4, 5 being thrown off near together from the extremity of the vein. The type was a female, as may yet be verified by the divided frenulum.

CAPIS CURVATA, n g. et sp.

A Deltoid form with the outline of *Lisyrhypena*, but the wings broader and shorter. Antennæ simple. Ocelli. Labial palpi moderately projected, third article short, a little depending. Fore wings broad, glistening deep brown, with a curved even s. t. line, outside of which the exterior margin is washed with white. Hind wings concolorous fuscous. Beneath paler fuscous, without markings. This species I have seen in Prof. Lintner's collection. One specimen in my own expands 20 mil. New York.

SOME PECULIARITIES OF ARGYNNIS IDALIA.

The males are very plentiful throughout the summer, flying about feeding on the flowers of the clover and milk-weed; but the females are exceedingly rare, and I never saw one feeding but once. I collected a whole summer and did not succeed in finding one. I never have seen the female on the wing, unless I had scared it from its hiding place. Of course the females must feed, but I cannot imagine when they do so. In trying to discover where the females were, I found that they remained hidden in the long grass of the fields near the ground, and they would not take wing unless you nearly stepped on them, when they would get up as quickly as a partridge. Their flight is exceedingly rapid and generally in a straight line for about 100 ft., and then they do not alight on a flower or bush or flutter about like the male, but suddenly drop like lead in the long grass. It would be almost impossible to tell the exact spot where they alight, as they drop so suddenly, but on approach near it they are off like a shot again. I was thus able to distinguish the males from the females by the peculiarities in their flight alone.

HARRY SKINNER, Philadelphia, Penn.

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The Canadian Entomologist.

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NOTES ON CERTAIN BUTTERFLIES, THEIR HABITS, ETC.

No. 1.

BY W. H. EDWARDS, COALBURGH, W. VA.

1. PAPILIO PHILENOR.

On 21st May, 1881, I saw a female *Philenor* fluttering about a low plant in the edge of the woods near my house. Apparently it was a vine just out of the ground—some four or five inches high—and three eggs were laid on the stem. I sent the plant to Mr. Scudder for determination at the Botanical Gardens, but he reported that there was not enough of it for that purpose.

On 1st Aug., I saw a female coursing over the hill side, alighting on various species of plants for an instant; sometimes on clover heads or other flowers, then flying again in short circuits, touching a leaf here and there. Perhaps it was ten minutes before she lingered on one plant longer than usual, though then but for three or four seconds, and I found on examination three eggs laid on the stem just below the terminal leaf. The plant was of the same species I had noticed in May, and I dug it up and planted it in the garden. When at Cincinnati, at the meeting of the A. A. A. S., I learned from Dr. H. S. Jewett that this must be Aristolochia serpentaria, a common plant about Dayton, O., and later I received from him several dried examples of it. I had no idea that this was what is spoken of by Dr. Boisduval, Lep. Am., as the food plant of *Philenor*, as it is wholly unlike other species of Aristolochia with which I am familiar, they being all vines, and this a low herb. Gray describes it as growing in rich woods, Conn. to Ind., and southward, the stems 8 to 15 inches high, leaves ovate or oblong from a heart-shaped base. The Virginia Snake-root of medicine.

2. PAPILIO MACHAON.

During the winter 1880-81 Mr. Mead sent me a large number of chrysalids of *Machaon*, imported by him from Germany, requesting me to turn

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the butterflies loose here as they emerged. The first one was female, out 6th May, when the lilacs were in blossom, and I placed it on the flowers. Others emerged day by day. On 9th, I recorded that I had turned out 40 to 50, but they soon disappeared and were not again seen. I saw one soon after I had placed it on the lilac, pursued by an *Ajax* as if it was regarded as an intruder. In all upwards of 100 were freed. About a week after the last butterfly had emerged, I caught a male near the house on a clover head, and this was the only *Machaon* I saw during the summer. I had planted a large quantity of Fennel, thinking the females might deposit eggs thereon, but diligent search failed to discover any.

3. Effect of Cold Applied to Larvæ.

1. DIANA. In 1873-4, I succeeded in rearing one of these larvæ from the egg to imago, starting with several hundred eggs; there were losses at every stage. The duration of each stage was also very great, of 2nd stage 16 days; of 3rd, 14; of 4th, 17; of 5th, 12 to 5th moult; from 5th moult to pupation 22 days; of the chrysalis 21; the butterfly emerging 9th June.

In Sept., 1880, I obtained about 100 eggs, and as soon as the larvae hatched, I sent most of them to Prof. Fernald, at Orono, Me., to go in an ice house. A few I kept myself and tried to carry them through the winter in a cold room, but by 11th Feb'y, 1881, all had died. Most of those sent to Orono also died from the ice giving out late in the fall apparently, but in one little paper box were a few larvae (10 or 12) still alive when I received it, 7th March. From these I raised 4 butterflies, and could have several more, had I not put one at each larval stage, and one chrysalis, in alcohol. The stages were in duration as follows, beginning at 1st moult, or the next one after hibernation :

No. 1. 2nd stage, 10 days.
3rd " 9 "
4th " 7 "
5th " 6 "
5th moult to pupation 13 days.
In chrysalis 19 days (♂).

No. 2. 2nd stage, 13 days.
3rd " 9 "
4th " 5 to 6 "
5th " 5 "
5th moult to pupation 13 days.
In chrysalis 19 days (♂).

No. 3. 2nd stage, 13 days.
3rd " 9 "
4th " 5 to 6 "
5th " 5 "

No. 4. 2nd stage, 14 days.
3rd " 9 "
4th " 5 "
5th " 6 to 7 "

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5th to pupation 14 days. In chrysalis 21 days (♀).

5th to pupation 10 to 11 days. In chrysalis 19 days (♂).

No. 1 was 64 days from 1st moult to imago.
No. 2 was 65 " "
No. 3 was 67 " "
No. 4 was 65 " "

Whereas the period of the larva before spoken of (1873-4) was 102 days from 1st moult to imago. The frozen larvae were healthy at all stages, and I lost none after 1st moult, except one in chrysalis.

2. CYBELE.

In Sept., '79, I obtained eggs of *Cybele*, and 7th Oct., I sent 40 larvae just hatched to Prof. Fernald, to go on ice. Others I retained, and tried in the usual way to carry them through the winter, but in Feb'y I found that these were dead. I received the lot from Orono 3rd March, '80. These were nearly 5 months in the sawdust next the ice in house, as Prof. Fernald wrote me. Two days after they reached me several were moving about, and I transferred them from the boxes to violet. The stages were :

No. 1. 2nd stage, 12 days.
3rd " 4 "
4th " 5 "
5th " 7 "

No. 2. 2nd stage, 10 days.
3rd " 6 "
4th " 7 "
5th " 4 "
5th moult to pupation 9 days.
In chrysalis 16 days.
From 1st moult to imago 62 dys.

No. 3. 2nd stage, 8 days.
3rd " 9 "
4th " 8 "
5th " 8 "
5th moult to pupation 12 "
In chrysalis 20 "
1st moult to imago 65 "

The first butterfly emerged 12th May (♂).

Here again, as in the case of *Diana*, above related, the periods were all shortened by the freezing the larvae had undergone, and the larvae were healthier at every stage. In 1874, out of 100 caterpillars of *Cybele* hatched in fall of '73, I obtained but 3 chrysalids, and from these 2 butterflies. From 1st moult to butterfly was 104 days.

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In 1874-75, I raised three butterflies, *Cybele*, starting with 219 eggs by count, obtained from one female, 5-7 Sept. The 1st moult occurred (in greenhouse) 13th Feb'y, 1st chrysalis was reached 29th April, and the butterfly emerged 24th May, the period from 1st moult being 100 days. I found the same result in freezing caterpillars from eggs laid by Satyrus *Nephele*, as I related in Can. Ent., vol. xii. It may be assumed that freezing through the winter preserves the lives and contributes to the good health of caterpillars which go into lethargy from the egg, all the way to the imago.

4. On Transportation of Eggs and Young Larvae.

I have frequently had eggs of butterflies sent me from points 5 to 12 days distance by mail, and except in rare instances, the larvae hatched *en route* have died in consequence of the decay of the leaves (food) sent with them. Some leaves, being of a dry nature, like Celtis, bear a 6 to 10 days journey from South Florida very well, and usually some larvae reach me alive. Willow does not bear this journey readily, and I have lost several lots of larvae of Limenitis *Eros* in consequence, though in two or three cases they have reached me alive. But Passion-vine has always decayed, even in 5 days. The leaves break loose from the stem and get rolled into a nasty rotten ball, destroying everything in the box. So I have several times lost larvae of H. *Charitonia*. I suggested to Dr. Wittfeld, who sent these, to tie each leaf of Passion-vine to the stem before boxing, to prevent their breaking off, and this has seemed to work better.

On 30th Aug. last, I made an experiment, putting a stem with half a dozen leaves of Passion-vine into an eight-oz. bottle and corking tight. This was placed in a dark closet. Temperature without was high, among the nineties daily. After ten days, I first discovered signs of mould and decay in the leaves, and then only in the tender terminal ones.

At same time I had bottled in similar manner two leaves of Pawpaw, on each of which an egg of P. *Ajax* had been laid that morning. At that season the eggs of *Ajax* would hatch in 4 to 5 days. On the 9th day, I observed the first signs of mould, and that on one leaf only. The other was sound, and two caterpillars were upon it, and both had just cast their skins at 2nd moult, the skins being still present. They had hatched about 5 days before, and though corked up and kept in the dark, were apparently as healthy as though all the conditions had been normal.

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I then requested Dr. Wittfeld to bottle leaves of Passion-vine and mail to me packed in a box, which he did. This was in October, and the package was 10 days on the road. Two leaves were rotten and worthless for food, but still held together, and four leaves were sound.

Therefore, it is plain that in corked bottles, or in air tight tins, eggs of butterflies can be forwarded from points 8 to 12 days distant, i. e., Florida, Texas, Arizona, California, Oregon, and the larvae from them will probably reach their destination in good condition.

I received several tin boxes (soda-powder boxes, and not air tight) from Arizona the past season, from Mr. Doll. Three contained eggs of two species of Lemonias, viz., *Palmeri* and *Nais*. They were sent on the leaves and stems of Mesquit, on which they had been deposited, and between layers of cotton wadding. As it happened, the eggs, though out 12 days, were but partly hatched when I got them, and the hatching proceeded. Had they hatched two or three days earlier, I should have lost every caterpillar, for the leaves were dry as tinder and unfit for food. I believe, as the result of several observations, that it is not well to place the leaves in cotton in any case, as this seems to extract the moisture from them. Even in so short a journey as from Coalburgh to Philadelphia, 26 to 30 hours, Mrs. Peart has noticed that whenever cotton was in the box with leaves, the latter had suffered.

Eggs should in no case be sent in wood or in paper boxes, as the leaves dry up at once, and any larvæ will starve. I am very anxious to receive eggs of any species of butterfly, especially of all Satyrids in Rocky Mts. to Pacific, including species of Chionobas; of all Argynnids and Parnassians; and if any collectors will send me these, or one or more of them, corked in glass, or in air tight tin, I will pay liberally for them, or exchange butterflies for them to any extent. I would gladly give twenty species of butterflies for one lot of eggs which I have hitherto not had.

5. On Irregularity of Number of Moults in Larva of APATURA FLORA.

In Psyche, vol. 3, p. 159, I enumerated the species of butterflies whose larvæ I had bred from the egg, and gave the number of moults of each. One or two had but three, nearly all had four, and some had five. When the species is two-brooded, and the larvæ of one brood hibernate, they usually pass five moults, but in the summer brood of the same species

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there are four.* In the case of Apatura *Celtis*, at Coalburgh, the species being two-brooded, there are five moults in the winter brood, four in the summer. In A. *Clyton*, which here has but one annual brood, there are five moults, the larvæ hibernating. In A. *Flora*, belonging to same sub-group with *Clyton*, as distinguished from *Celtis*, but a Florida species and double-brooded, I cannot speak as to the number of winter broods, but in the summer of 1880, I found four moults only. I received eggs from Indian River in July, and raised nine larvae to imago. But in 1881, I raised larvae in August, from eggs received from Indian River, and all passed five moults. Mrs. Peart, who was feeding two of this lot of larvae, and making drawings of each stage, wrote me 25th Aug. that both had passed 5th moult, and I had discovered the same thing myself.

In 1880,				In 1881,			
1st moult,	24th July.			1st moult,	3rd Aug.		
2nd "	28th "	4 days.		2nd "	7-8th "	4½	dys.
3rd "	1st Aug.	3	"	3rd "	12th "	3½	"
4th "	5-6th "	4½	"	4th "	18th "	6	"
Suspended	14th "	7½	"	5th "	24-25th "	6½	"
				Suspended	1st Sept.,	7½	"

In 1880, from 3rd moult to suspension was 13 days; in 1881 was 20 days; and the length of this last period would seem to make an additional moult necessary, but why the stages were so protracted in '81 and so short in '80, I cannot guess. The conditions were similar so far as I know. In '80, I had 4 males, 6 females from chrysalis, in '81 both sexes, though I do not appear to have made a note of the exact number of each. But as all the larvae in one year passed 4 moults, and all in the other 5, the difference was not sexual.

6. The proportion of chrysalids of PAPILIO AJAX which go into premature hibernation does not always increase as the season advances.

Mr. Scudder states this as a rule, in "Butterflies," p. 172. In 1872, I related my observations on *Ajax*, and I say: "It will be noticed that a large percentage of the chrysalids of nearly every brood pass the winter, the proportion *seeming to increase as the broods succeed each other.*" Now

* I omitted to state in that paper, that Limenitis *Disippus* makes its case in the fall either after second or third moult. Of 7 larvæ in Oct., 1881, 5 went into their cases after second moult, 2 after third. I have noticed the same thing in former years, but no larva has passed more than two moults after hibernation. So that this species would have both 4 and 5 moults in the winter generation.

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this rule is not absolute. In 1881, from eggs laid by the form *Telamonides*, I had 26 chrysalids, the last of which formed 19th June. From these, 4 butterflies only emerged the same season, and the rest of the chrysalids are now passing the winter. If the rule above set forth held, the proportions should have been reversed, or 22 butterflies should have emerged and 4 chrysalids passed the winter.

7. AJAX, WALSHII and TELAMONIDES.

Mr. Raphael Meldola, in Ann. and Mag. Nat. Hist., xii, 1873, made some remarks on my history of *Ajax*, But. N. A., v, 1, to which Mr. Scudder called attention in Proc. Bost. Soc. Nat. Hist., vol. xvi, 1874, and this last paper closed with these words: "Mr. Edwards had not drawn attention to the fact that *Walshii* and *Telamonides* belonged to the same brood; the former consists of earlier, the latter of later individuals from wintering chrysalids; the second brood of the species (the first from short-lived chrysalids) is *Marcellus*, and made up of the mingled progeny of both *Walshii* and *Telamonides*."

In the "Butterflies," p. 170, Mr. Scudder again refers to this: "The first two (*Walshii* and *Telamonides*) do not appear to represent distinct *broods; and this point, to which Mr. Edwards strangely failed to draw attention in the first account of his observations*, is one of the most extraordinary features in the history of the insect; for *Telamonides* is not the direct con-seasonal produce of *Walshii*, but both are made up of butterflies which have wintered as chrysalids, those which disclose their inmates earliest producing *Walshii*, the others *Telamonides;* while all butterflies produced from eggs of the same season, and there are several successive broods, belong to *Marcellus*."

The experiments recited in But. N. A. ran through two seasons, 1870, 1871. In the former they began with *Telamonides*, circumstances making it impossible for me to begin with *Walshii*, the earlier form. During the following winter nearly all the hibernating chrysalids were destroyed by a fire which burned my house. But the experiments and observations enabled me to say in the text, "that from *Telamonides* came *Marcellus* the same season, and *Telamonides* in the following spring; that from *Marcellus* came successive broods of *Marcellus* the same season and from the last brood *Telamonides* in the spring." Also, "these observations failed to determine the connection between *Walshii* and the other two forms," and I therefore set myself at work to ascertain what that might be, by breeding

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from *Walshii* as well as the other forms, and continued the experiments the season through. Now, in Jan., 1872. Part ix of the But. N. A., which contained *Ajax*, issued, before the chrysalids which hibernated had given imagos. But I had discovered enough during the two seasons, and by outside observations, to enable me to say: "The summing up therefore of this whole series of observations is this: *Walshii* produces *Walshii*, *Telamonides* and *Marcellus* the same season; *Telamonides* produces *Marcellus* the same season and its own type in the spring; *Marcellus* produces successive broods of *Marcellus* the same season, and occasionally *Telamonides*, *and the last brood produces Walshii and Telamonides in the spring; and whenever any of the chrysalids of either brood of Marcellus pass the winter they produce the other two varieties (forms)*, and probably sometimes their own type (individual, i. e., *Marcellus*, taken April, 1867). The chrysalids of *Walshii* that pass the winter of 1871–2 will probably produce *Walshii* or *Telamonides*."

It seems to me that this statement is explicit as to *Walshii* and *Telamonides* together being the product of one or any lot of eggs laid by *Marcellus* ♀ the previous year. As to what the chrysalids of *Walshii* or *Telamonides* might actually produce I could not then state with certainty, for the reason given. Since that first account I have spoken of these forms and their relationships in several papers, and it was hardly necessary for the author of the "Butterflies," ten years later, to call attention to a strange omission in my first account, even had there been such an omission, when subsequent observations described by me made the whole history clear. It certainly was not strange that I did not state as fact more than I then knew. At all events, what I have not discovered about *Ajax* no one has discovered, for my observations to this day are the only ones on record.

NOTE ON CHIONOBAS VARUNA.

BY W. H. EDWARDS.

After the description of this species in the Jan. No. was in type, I received a letter from Mr. A. G. Butler, to whom I had sent an example, with request to be informed if it was *Tarpeia*, spoken of in his Catalogue of Satyridæ as being N. American. Mr. Butler writes: "Your Chionobas

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is very distinct from C. *Tarpeia;* the latter comes nearer to C. *Chryxus*, being quite a fulvous species, with blind ocelli on under surface. The band of secondaries also is altogether different in outline"; and Mr. Butler gives me a drawing of the wing and band. His drawing and description in all points named agree with what Mr. Scudder formerly described as C. *Calais*, from a single female taken by Mr. Drexler 20 years ago, at Rupert House, Hudson's Bay, and on carefully comparing this (which remains unique in my collection) with a series of C. *Chryxus* from the Rocky Mts., I see that it is a distinct species, and not *Chryxus*, as of late I had assumed.

NOTE ON LIMENITIS URSULA.

BY W. H. EDWARDS.

In my paper on L. *Arthemis* and its alleged second brood, in Dec., 1881, I stated that some caterpillars of L. *Ursula* did go on to chrysalis and butterfly late in the year, in Ohio, though others of same lot went into their hibernacula when half grown; and that I had dissected one female *Ursula* which emerged in September last, and could discover no signs of eggs, or at any rate, there were no formed eggs. Also that I had sent a second female of same lot to Prof. Minot for examination. I now have his report, as follows: "There were certainly no ripe eggs in the abdomen, although there were a great many eggs in an immature condition." I stated in the above mentioned paper, that the existence of the species *Ursula* did not depend on these late, or September butterflies; and the reason is, that the female coming so late, and with immature eggs, the season would either not allow the eggs to ripen, or if it did, and they were impregnated, which would be doubtful, it would not allow the larvæ to hatch and to reach the hibernating stage. There is not time for all this before frosts or cold weather. Of course, the same would hold good of *Arthemis*, if possibly any females of a second brood should emerge.

ON TWO GENERA OF PHYCIDÆ.

BY A. R. GROTE.

I find that unless we use neurational characters to separate the genera of *Phycidæ*, that it will be impossible to classify the species with accuracy. All characters drawn from the periphery, the appendages of the body, will

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be found subject to very gradual modifications, but I do not think we can afford to reject any of them, because of their relative want of stability. Indeed the neuration in the Lepidoptera seems to be as useful as in the Diptera, although there are certain cases (as I long ago pointed out with regard to *Thyridopteryx*) where it varies not only in the species, but in the opposite wings of the same specimen. I think that we must regard as generically distinct from *Pempelia* the North American species *Pravella*, which has 8, instead of 7 veins to the hind wings (see Bull. U. S. Geol. Surv. 4, 694). For this species, the structure of which I have quite fully described, I propose the generic name *Meroptera*. I also find that our two species, found in Texas and Colorado, and which probably mine the Agave, viz., *Bollii* and *Dentata*, are distinct from the European types of *Zophodia*, to which Prof. Zeller referred *Bollii*, the type of the new genus *Megaphycis*. In the structure of the palpi, shape of the wings, greater size and length of body, our two large species differ strongly.

I have also here to correct a mistake of mine in the use of the term "porrect" in this group as applied to the labial palpi (e. g. in *Pinipestis*). I meant by it *ascending*, whereas it appears that it is equivalent to *extended forwards*. The term appears inconvenient to use, and perhaps I am not alone in mistaking its sense.

A NEW APPLE TREE PEST.

BY CHARLES R. DODGE, WASHINGTON, D. C.

As if the apple tree with its sixty or more insect enemies were not sufficiently afflicted, a distant relative of the Canker-worm has been making itself so notorious in Georgia, as to give apprehension of the total destruction of apple orchards in the locality infested. The insect complained of is *Eugonia subsignaria* Pack., a measuring worm which at times has been a veritable nuisance upon shade trees in New York and Philadelphia.

In pursuance of my duties as a Special Agent of the Census Office (in the fruit interest), and through subsequent correspondence, the following facts were obtained from Mr. Adam Davenport, of Fannin County, in the State named. In his first communication, received some months since, it is stated that the worm made its appearance upon Rich Mountain, a spur of the Blue Ridge, about four years ago, attacking forest and fruit trees;

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and that it had since spread over a large area, doing great damage. Apple trees in June last were as destitute of leaves as in mid-winter, the fruit growing to the size of marbles and falling off.

A late communication—with replies to a series of questions—shows the destruction to be even worse than at first reported. I give Mr. Davenport's own words :

"The insect made its appearance four years ago upon Rich Mountain, since which time it has been spreading in a northern semicircle at the rate of about fifteen miles a year. It is by far the most interesting insect that has plagued this country since the first white settlement. So wonderfully prolific, that in two years it literally covered every tree, bush and shrub, and with the exception of a few varieties, stripped them of their leaves.

"The egg hatches about the first of May, and the caterpillar, which is dark brown, lives about forty days, transforms to a chrysalis, lives in this state about ten days, and emerges a milk-white miller. For two weeks before their first transformation the fall of their excreta, in the woods, resembles a gentle shower of rain, and from its abundance tinges the streams a dark green hue. I have seen trees that had been stripped of their foliage, entirely wrapped up in their silken webs, resembling, when covered with dew, a wrapping of canvas. They constitute a great feast for all insectivorous birds and animals ; it is said that even cattle and sheep eat them with great greed. They have an instinctive way of protecting themselves by losing their hold upon the limb, at the slightest touch, and swinging by their web in the air. For this reason they are easily shaken off into sheets and destroyed ; however, they are so numerous, this remedy is worth nothing except in keeping them off very small trees. This instinct is not lost after leaving the caterpillar state, for if a bird alights upon a tree above the millers, they suddenly drop like a shower of snow to the ground for protection."

In the Practical Entomologist, volume 1, page 57, an anonymous writer gives an account of this insect's attacks on elms in Philadelphia. Dr. Packard, in his Monograph of the Geometrid Moths, page 528, mentions only elm as a food plant, but Prof. Thomas, in his Second Illinois Report, page 243, says : "I have not noticed them feeding upon that tree, but have twice found them feeding upon apple, upon the leaves of which I have reared them to the perfect insect. In neither case were they numerous." Prof. Comstock makes brief mention of the insect in his

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recent report as United States Entomologist, quoting Mr. Davenport, as above, to the effect that the worms were destroying forests of hickory and chestnut, and were damaging fruit trees. This statement doubtless refers to the season of 1880.

The infested district in Georgia is not less than 60 miles long by 40 wide, and embraces Union County on the east, Gilmer on the west, and Polk County, Tennessee, on the north. They have been injurious two years, but in the summer of 1881 they were most destructive.

It is stated in the Practical Entomologist that the eggs are deposited in masses of fifty upon the limbs of the tree. A piece of apple bark before me presents an irregular patch over three inches long, and ¼ to ½ nch broad, the eggs closely crowding upon each other. As there are many hundreds, they have doubtless been deposited by a number of moths, which attests the truth of Mr. Davenport's statement regarding heir falling in showers like snow.

They are deposited for the most part on the under side of the limbs n the tops of the trees, and not only upon the bark, but the tufts of moss are covered by clusters of them. The eggs are smooth, dull, irregularly ovoid, slightly flattened upon the sides, rounded at the bottom, while the top is depressed, with a whitish rim or edge, forming a perfect oval ring. Color yellowish brown, resembling brown glue. Length of examples before me, .04 inch; width, lying upon the flattened side, .03 inch; thickness, or smallest diameter, .02 inch. They are deposited in curved or straight rows of a dozen or more (or less), these lines forming masses often of many hundreds.

The name, *Eugonia subsignaria*, is given on the authority of Mr. Davenport, supported by his descriptions in answer to my questions, as I have had no means of determining the species. There is no doubt in my mind, however, of the insect's identity.

NOTE ON THE GENUS TRIPUDIA AND ON THE SPECIES OF SPRAGUEIA.

BY A. R. GROTE.

On pages 231 to 238 of the CANADIAN ENTOMOLOGIST for 1879, I gave a list of the species of *Spragueia* and allied genera. I am still in doubt of the position of *Apicella*, from want of material to examine. It may belong to *Fruva*, which can be readily ascertained. The genus *Tri-*

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pudia may be identical with *Oribates* of Hy. Edwards, described more recently. I have seen the type of *O. Versutus*, and, without being able to compare it, it seemed to me identical with my previously published *Tripudia flavofasciata* Grote, CAN. ENT., 1877, p. 69. The type of *Tripudia* is this species, to which I have joined *quadrifera* of Zeller, from Texas, as a second. Whether the orange species *Muirii* and *limbatus* belong here can be ascertained by proper dissections, which should be undertaken as soon as possible.

The species of *Spragueia* have received two interesting additions since the publication of the List. The first of these is *Pardalis*, collected in Florida by Mr. Thaxter. It is allied to *dama* by the orange fringe of primaries interrupted with dark opposite the cell. The costal spots are smaller and pale; the wing is blacker and there is a pale costal spot at base, wanting in its ally.

The second species is *Funeralis* from Arizona, collected by Mr. Doll. It is of a peculiar silky dark leaden hue, with concolorous fringes. A large pale spot outside the t. p. line on costa. Two pale bands enclosing orange lines and swelling into wider spots at costa, where the outer band encloses a dark streak. The species are similarly sized and are very interesting from their brightly marked and narrow primaries. While recalling the European *Erotyla sulphuralis* in ornamentation, they are structurally distinct, as I have shown (l. c.). Our North American species are now as follows:

SPRAGUEIA Grote.

onagrus Guen. Fla.
Type *leo* Guen. Ala.
plumbifimbriata Grote. Tex.
funeralis Grote. Arizona.
dama Guen. Ala., Tex.
pardalis Grote. Fla.
guttata Grote. Tex.
tortricina Zell. Tex.
? *apicella* Grote. Ala., Tex.
= *truncatula* Zell.

A NEW SPECIES OF ICTHYURA.

BY G. H. FRENCH, CARBONDALE, ILL.

ICTHYURA PALLA, n. sp.

Length of body, including anal tuft, .56 of an inch. Expanse 1.10 inches. General color of body and primaries pale gray, the latter rather sparsely sprinkled with dark brown scales. Palpi brown above, scarcely

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projecting beyond the head, third joint concealed by the hairs of the others. Front slightly brownish, a tuft of pale gray scales at the base of each antenna, the usual deep brown mark from between the antennæ to the top of the thoracic crest. Primaries with the usual transverse lines almost white. The basal line makes a bend outward on the median vein; from this it goes in a straight course to the submedian vein; from this to the posterior or inner margin it curves a little outward. A second line extends from the costa about one-fourth of the distance from the base obliquely to the posterior margin, near the posterior angle. A third line passes straight across the wing from the posterior margin to the second, a little below the median vein. The fourth begins as a white spot on the costa a little more than two-thirds of the distance from the base, and joins the second on the posterior margin, making the usual "V" as in the allied species. The fourth line is slightly S-shaped in its costal third. Outside the fourth line is a subterminal, somewhat zigzag row of black spots, some of which are often faint or obsolete. In the discal cell there is usually a faint oblique line that seems to be a continuation of the third line, though it does not reach the costa, and the end of the cell sometimes appears like a short line. There are three oblique shades of brownish olive more or less distinct, that cross the wing parallel to the second line; the first, beginning on the costa inside the basal line, faintly borders that line to the submedian vein. and is seen below that vein on the third line; the second outside the second line through its whole course, is darkest next the line; the third from both sides of the fourth line to the middle of the outer border, faint, except along the line. Just outside the S-part of the fourth line are three grayish-yellow spots with a few reddish-brown scales. Secondaries pale smoky gray with a faint whitish line from the fourth of the primaries (as the wings are spread) to the anal angle. Under side, the primaries are about the color of the secondaries above, pale along the costa and terminally, the secondaries paler with a dark transverse line.

Described from 2 ♂ and 3 ♀, all reared specimens.

Larva.—Length 1.25 inch when crawling, body nearly cylindrical, two black tubercles, close together, on the top of joints 3 and 11. On the dorsum are four bright but narrow yellow lines alternating with narrow black ones. The stigmatal line black; above this, or the subdorsal space, an irregular alternation of black and white. Below the stigmata a narrow

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yellow line; below this, or the substigmatal space, the body is flesh color. Head shining black. There are a few gray hairs scattered over the body.

These larvæ were found feeding on willows through the most of September, resting in an enclosure formed of several leaves fastened together at the ends of twigs, but I did not find more than half a dozen in a nest. Those put in breeding cages pupated before the middle of October, mostly in the corners of the boxes. The first hatched April 22, 1881, the last May 8. I took one fresh specimen that had flown to light May 28.

This form is related to *Inclusa* Hub. and *Ornata* G. & R., more nearly to the latter in size and coloration, but differs from both in several particulars. Besides size and color, it differs from *Inclusa* in the coloring of its larva. It differs from *Ornata* in the color of the scales sprinkled over the primaries, the color of the spots outside the fourth line, and the continuance of that line, as it is not here partially obsolete opposite the disc, as well as in some other points. The apices are no more produced than in *Inclusa*, nor is the costa more bent.

ON THE CHALCIDIDÆ OF FLORIDA.

(Paper No. 2.)

BY WM. H. ASHMEAD, JACKSONVILLE, FLA.

Genus EUPELMUS, Dalman.

Prof. Westwood, in his *Generic Synopsis*, characterizes this genus as follows: "Antennæ 13-jointed, clavate, third and fourth joints minute; club ovate; thorax long-ovate; collar moderate; thorax depressed in the middle; abdomen long-ovate; *ovipositor exserted*, wings with stigmal branch distant from the union of the subcostal nerve and the costa."

In view of the recent controversy between Prof. Riley and Mr. Howard, in regard to this genus and the genus *Antigaster* of Walsh, I deem it advisable to publish the above from Westwood, *verbatim et literatum*. Just beginning my entomological studies, I do not pretend to take issue with either of these gentlemen, but merely desire to draw their attention to the *ovipositor* in this genus, which both seem to have entirely overlooked, and which, according to above description, is *exserted*.

Now, I have bred a great many specimens of *Antigaster mirabilis* from eggs of *Microcentris retinervis*, and neither this species nor those recently

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described by Mr. Howard, have exserted ovipositors. Does this not throw some light on their generic position?

I describe below two new species belonging to *Eupelmus* genus, if Westwood's definition of it be correct. I must acknowledge, however, that the antennæ, wings and formation of thorax strikingly resemble *Antigaster*. The exserted ovipositor would, however, easily distinguish them.

EUPELMUS ROSÆ, n. sp.

♀. Length .10 inch; ovipositor .02 inch. Head wider than thorax, greenish-golden, finely transversely punctate and with slight purplish reflections; front purplish, with metallic reflections, beneath eyes greenish and with the punctures converging towards mouth; eyes purplish; antennæ 10-jointed, clavate, scape metallic green to near tip, flagellum black, joints 6 to 9 shorter than the rest and about equal in length; thorax long ovate, collare short, corners bulging, praescutellum depressed, depression extending from corners of collare and converging and uniting towards scutellum, greenish golden, finely transversely punctate and with purplish reflections; the triangular pieces back of praescutellum are greenish with edges well rounded; scutellum highly convex, longer than broad, greenish with posterior half purplish; the side piece is one elongate convex surface extending from before the insertion of the wing to hind coxæ, purplish, with greenish metallic reflections; wings hyaline, iridescent, with yellowish veins; the subcostal joins the costa at less than one-third the length of wing, the vein then extending to more than two-thirds, with a thin stigma near tip; hind wings strongly iridescent; abdomen long-ovate, slightly depressed, purplish black, with slight cupreous and metallic green reflections; ovipositor black, annulated with yellow in the middle; legs—coxæ black, trochanters yellowish, fore and middle femora and tibiæ yellowish, the middle pair slightly dusky in the middle; all tarsi, except at tip, white; posterior femora and tibiae, excepting at knees and tip, which are yellowish, black; a short tarsal spur; tarsi white, brownish towards tip, basal tarsal joint of middle pair of legs slightly widened.

Described June 17th, from one female specimen bred from Cynipidous rose-gall, *Rhodites r. lucidæ* (Ashmead MS). A gall found on a wild rose bush growing along the borders of our rivers and swamps.

EUPELMUS CYNIPIDIS, n. sp.

♀. Length .15 inch; ovipositor .05 inch. Head slightly wider than

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thorax, greenish golden, with the surface crackled and sparsely covered with short fine hair; eyes brownish purple; antennae 10-jointed, black; thorax elongate ovate, greenish brassy with a slightly elevated, golden, finely transversely punctate shield in centre, extending from collare to two-thirds length of praescutellum, with the posterior end rounded, a depression on either side running squarely off posteriorly perfectly smooth and shining; the scutellum small and convex, with the triangular praescutellar pieces, almost joining, so closely do they press against it; it is brassy but ends posteriorly in a small, flattened, triangular point; abdomen purplish black, flattened above, keeled below; ovipositor at base for one-fifth the length purplish black, balance reddish brown; wings hyaline, veins yellowish to juncture of subcostal with costa, balance brown, a large smoky brown blotch extending across the entire wing from one-fourth the length to near the tip of the wing; legs uniform reddish brown.

Described from one female bred specimen, bred May 2nd, from Cynipidous live-oak gall, *Cynips q. batatoides* Ashmead.

Genus Coccophagus, Westwood.

Coccophagus annulipes, n. sp.

♀. Length .04 inch. Vertex of head red, ocelli black and triangularly arranged; eyes greenish, face and around mouth parts green, mandibles tipped with black; antennæ 9-jointed, clavate, scape somewhat widened, black, 2nd joint larger than 3rd and 4th, basal half black, apical half greenish yellow, joints 3 and 4 small, red, others gradually widening to club, greenish yellow, club large and black; thorax longer than abdomen, collare very narrow, greyish or greenish; mesothorax red, praescutellum transverse, occupying the whole dorsum; scutellum very large and triangular, the base being as broad as the praescutellum, both sparsely covered with short whitish hairs; beneath, the surface, with the coxæ, femora and tibiæ are the color of milky water, tibiae annulated with two black bands, tarsi yellowish, ungues black; abdomen obtusely pointed, blackish above, greyish and with an ovipositor-groove beneath; from a stigma on each side issue three long black hairs; wings hyaline, closely covered with short hairs, veins yellowish.

This unique little species was bred from a large brown Coccid scale (*Lecanium* sp.) occurring on *Quercus aquatica*, and the description is made from two female specimens, which hatched April 17th.

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CORRESPONDENCE.

EXPERIMENTS WITH YEAST IN DESTROYING INSECTS.

We are indebted to Dr. H. A. Hagen, of Cambridge, for the following letter and the subsequent remarks on this interesting subject:

Kingsworth, Ashford, Kent, Dec. 27, 1881.

DEAR SIR,—

I beg to thank you very much for your letter, dated Nov., 1880, respecting the application of yeast for destroying insect pests. During the past season I have endeavored to follow the instructions contained therein, and as you express a wish to hear of my success or failure, I will attempt to describe my experiments as clearly as possible. As soon as Aphides became noticeable, I procured some German compressed yeast, dissolved an ounce in a little warm water, added a little coarse sugar, and set it to ferment. In about 24 hours I added sufficient water to make up a gallon, and with this syringed a cherry tree attacked by black Aphides. This was on the 16th of June. Four days later I found the tree almost clear of living Aphides, though their dead bodies, or cast skins (I could not ascertain which, although I asked the assistance of an entomological friend) smothered many of the leaves. One remarkable point in this experiment was that a small branch of the tree, loaded with Aphides, hung over a window, and at the request of my wife, I abstained from syringing it. Here the insects remained perfectly healthy, and after a few days were seen to work down the tree and attack the young shoots that had been washed clean. On June 29th I again dressed the tree, and this time destroyed or drove away every Aphide. I may add that the larvae of several Aphidivorous insects were present on the tree, and did not appear greatly affected by the application. Encouraged by the apparent success attending the application, I commenced operations, June 20, on a second cherry tree. This, however, was heavily leafed, and I could not make so much impression, but they evidently did not like the dressing, for they disappeared entirely soon after the second application. I also tried the yeast for Aphides on Guelder Rose (Viburnum), Elder (Sambucus), Field Bean, and some other plants; also for Currant Grub, but could make no decided mark anywhere. With respect to the Currant and Gooseberry Grubs, the liquid ran from off their bodies clean, and I found it almost impossibie to saturate them with it. If the syringing was persisted in, they

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would release their hold and fall to the ground, but very shortly crawl up again. To conclude, I was delighted with the apparent success of my first experiment, but all subsequent trials were so discouraging that I fear yeast is too uncertain in its action to supersede many of the washes we have already in use. Again thanking you for your kind letter, I beg to subscribe myself, sir, Yours most respectfully,

THOS. H. HART.

To Dr. H. A. Hagen, Cambridge, Mass., U. S. A.

This interesting letter by Mr. Thos. H. Hart, who owns nurseries and greenhouses, allows the following conclusions :

I. It is doubtless true that in the experiments of June 16 and 20, the Aphides were killed, as upon the branch not syringed they remained in perfect health.

II. It is doubtless true that the later experiments were a failure.

III. It seems evident that the yeast has not contained Isaria, or other fungi obnoxious to insects, to which the first success could be ascribed ; otherwise the later application of the same fluid ought to have had the same effect, or even by the multiplication of the fungi, a more marked effect.

Experiments made in Germany and here had exactly the same result, first success, later failure. In Germany it was made on a jasmine, in a flower pot, and the previously rather sick plant was in 1881 in good health and perfectly free of Aphides. Some currant shrubs on the left side of my house were entirely free through the whole year (without fall generation) after the experiment, though similar shrubs on the right side of my house were badly infested with currant worms ; I had here purposely not applied yeast. After all I believe it can be concluded that a *certain stage* of the yeast solution is needed to make it effective, and that after this stage it becomes indifferent. That yeast solution has killed insects seems to be undoubtedly proved, and it remains only to find out the stage in which its application is successful. It is sure that success, even in a very small number of experiments, cannot be annihilated by failure in other experiments. H. A. HAGEN.

PIERIS RAPÆ IN NEBRASKA.

DEAR SIR,—

I am sorry to note the appearance of *P. rapæ* in Nebraska. August 3rd, 1881, I first saw a living specimen ; needless to add that it was busily

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engaged in a cabbage patch. Others soon appeared, and before cold weather set in it had become quite abundant and larvæ in an advanced stage of growth were found in November. Probably the butterfly crossed the Missouri in the summer of 1880. We are here thirty-five miles west of the river, a distance that could hardly have been traversed in one season. It also appears that the cabbage crop has been almost totally destroyed in the eastern part of Dodge County and farther east, while here a partial crop has been secured notwithstanding the visit of the imported pest, supplemented by an unusual abundance of the Cabbage Plusia. August 1st, 1873, when I left my former home in Bureau County, Illinois, *rapæ* had not yet reached that place; therefore in less than eight years its westward progress upon this parallel has taken it across the State of Iowa and the Mississippi and Missouri Rivers.

The question naturally arises—Will the insect stop short when it reaches the grassy plains of Western Nebraska, or will it press onward to the cabbage gardens of Utah and the Western slope? By the aid of man it might soon cross the plains, even if it subsisted wholly upon cabbages; but being not averse to other cruciferous plants, it will find its way made easy. A mustard-like plant of this family with pink flowers grows along the embankment of the Union Pacific Railway, nearly if not quite throughout the whole distance from Omaha to Ogden. At Ogden Junction it is the most abundant of wild plants. If this plant furnishes a suitable food, *P. rapæ* will have little difficulty in surmounting all obstacles that bar its progress toward the valley of the Salt Lake.

G. M. DODGE.

Glencoe, Dodge County, Nebraska.

EXCHANGES.—I would like very much to effect some exchanges with Entomologists in Canada in Lepidoptera. I have a great quantity of good material in duplicate from our Adirondack region, from the South and West, and from Europe. W. W. HILL, Albany, N. Y.

DONATION.—We desire to return our sincere thanks to Prof. J. T. Bell, of Belleville, who has kindly sent to our Society a number of very interesting mounted microscopic objects, including Polycistina and Diatomacea from Vancouver Island—a most useful addition to the cabinet of objects in our rooms.

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The Canadian Entomologist.

VOL. XIV. LONDON, ONT., MARCH, 1882. No. 3

ENTOMOLOGY FOR BEGINNERS.

THE POLYPHEMUS MOTH—Telea Polyphemus.

BY THE EDITOR.

The caterpillar of this insect is also known as the American Silk Worm, in consequence of its having been extensively reared for the sake of its silk. When full grown the larva presents the appearance shown in

Fig. 4.

figure 4, is over three inches in length, with a very thick body. It is of a handsome light yellowish-green color, with seven oblique pale yellowish lines on each side of the body; the segments, which have the spaces between them deeply indented, are each adorned with six tubercles, which are sometimes tinted with orange and have a small silvery spot on the middle, and from each one of which arise a few hairs. The head and anterior feet are pale brown, the spiracles pale orange, and the terminal

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segment bordered by an angular band resembling the letter V, of a purplish-brown color.

When mature the caterpillar proceeds to spin its cocoon within an enclosure usually made by drawing together some of the leaves of the tree it has fed upon, some of which are firmly fastened to the exterior of the structure. The cocoon, fig. 5, is a tough pod-like structure, nearly oval in form and of a brownish-white color, and within it the larva changes to an oval chrysalis of a chestnut brown color, represented in fig. 6.

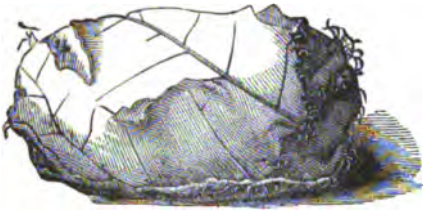

Fig. 5.

Usually the cocoons drop to the ground with the fall of the leaves, and in this state the insect passes the winter.

Late in May or early in June the prisoner bursts its prison house, when there is revealed a large and most beautiful moth, the male of which is well shown in fig. 8, p. 44, the female in fig. 9, p. 45. The antennæ are feathered in both sexes, but more widely so in the male than in the female. The wings, which measure when expanded from five to six inches across, are of a rich buff or ochre yellow color, sometimes inclining to pale grey or cream color, and sometimes assuming a deeper, almost brown color. Towards the base of the wings they are crossed by an irregular pale white band, margined with red; towards the outer margin is a stripe of pale purplish white, bordered within by one of deep, rich brown. Near the middle of each wing is a transparent eye-like spot, with a slender line across the centre; those on the front wings are largest, nearly round, margined with yellow, and edged outside with black. On the hinder wings the spots are more eye-like in shape, are margined with yellow, with a line of black edged with blue above, and the whole set in a large oval patch of rich brownish-black, the widest portion of the patch being above the eye-spot, where also it is sprinkled with bluish atoms. The front edge of the fore wings is grey.

Fig. 6.

This lovely creature flies only at night, and when on the wing is of such a size that it is often mistaken in the dusk for a bat. Within a few

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days the female deposits her eggs, glueing them singly to the under side of the leaves, usually one only on a leaf, but occasionally two or even three may be found on the same leaf.

The egg is about one-tenth of an inch in diameter, slightly convex above and below, the convex portions whitish, and the nearly cylindrical sides brown. Each female will lay from two to three hundred eggs, which hatch in ten or twelve days.

This insect is subject to the attack of many foes, particularly while in the larval state. A large number fall a prey to insectivorous birds, and they also have insect enemies. A large ichneumon fly, *Ophion macrurum*, see fig. 7, is a special and dangerous foe. This active creature may often be seen in summer on the wing, searching among the leaves of shrubs and trees for her prey. When found she watches her opportunity, and places quickly upon the skin of her victim a small, oval, white egg, securely fastened by a small quantity of a glutinous substance attached to it. This is repeated until eight or ten eggs are placed, which in a few days hatch, when the tiny worms pierce through the skin of the caterpillar and begin to feed on the fatty portions within. The *Polyphemus* caterpillar continues to feed and grow, and usually lives long enough to make its cocoon, when, consumed by the parasites, it dies; in the meantime the ichneumons having completed their growth, change to chrysalids within the cocoon, and in the following summer in place of the handsome moth there issues a crop of ichneumon flies. It is also subject to the attacks of another parasite, a tachina fly. Should the insect ever appear in sufficient numbers to prove troublesome, it can be readily subdued by hand-picking. This larva feeds on a variety of trees and shrubs, such as plum, oak, hickory, elm, basswood, walnut, maple, butternut, hazel, rose, &c.

Fig. 7.

As this moth has been found to be easily propagated, extensive experi-

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ments have been tried with the view of producing silk for commercial purposes from the cocoons. The silk is rather coarser than that of the

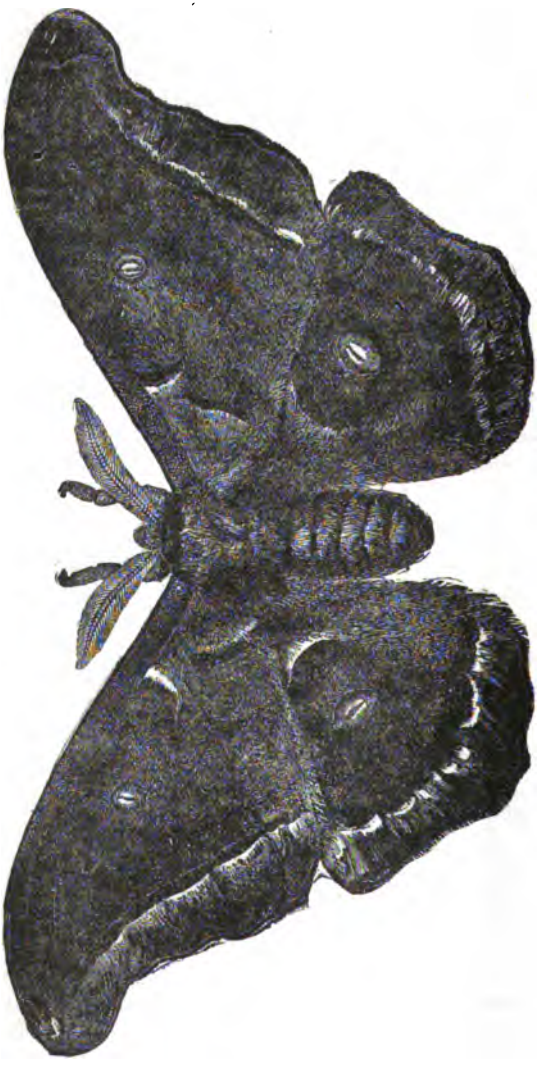

Fig 8.

common silk worm, *Bombyx mori*, has a continuous thread, and can be readily unwound. A measure of success has attended these efforts, but

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not sufficient, it sppears, to secure their continuance, and we know of no one now raising these larvæ for the purpose of obtaining silk for com-

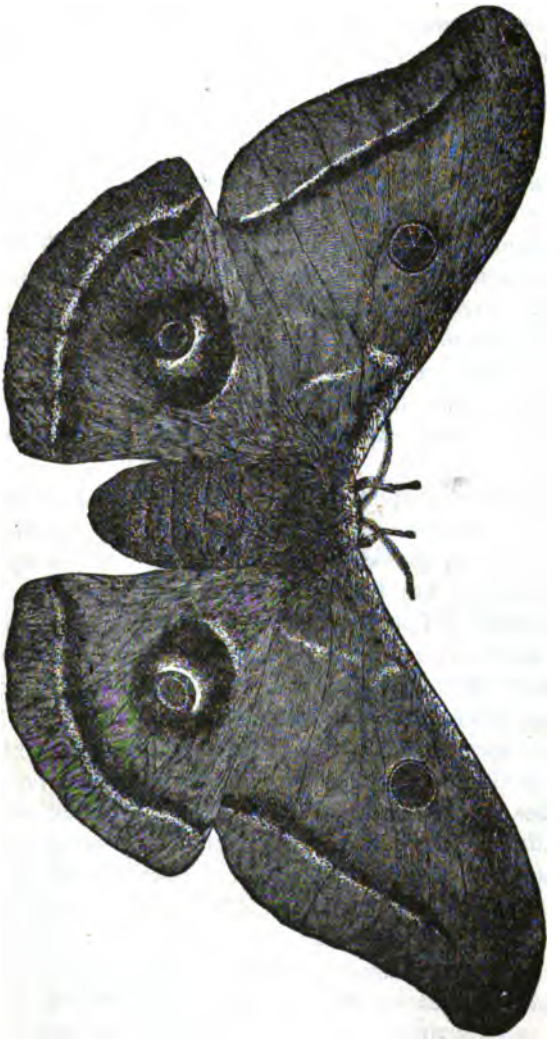

Fig. 9.

merce. The insect has also been introduced into France with a similar object, but with what success we have not learned.

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EUROPEAN WRITERS ON NORTH AMERICAN MOTHS.

BY A. R. GROTE.

For more than twenty years I have been endeavoring to complete the synonymy of our moths, and to find out what species were covered by Walker's and Guenée's descriptions. During this time I have made three trips to Europe, with this object more or less directly in view. Comparatively few of M. Guenée's species remain unknown to me; and as many of these were collected by Doubleday, the types will probably be found in the British Museum. Mr. Guenée's descriptions of species are good, and among the best extant, but he does not give structural characters. The microscope was not used by him. His genera contained incongruous material. When he had a species that he did not know what to do with, instead of making a new genus for it, which would have assisted the identification of the species, he often made a group of it, under a genus to which it was opposed in every structural feature—and the species in this way was readily over-looked. As, for instance, *Leucania Littera.*

Mr. Walker's descriptions are entirely misleading, because his types prove that he made no serious study at all of the matter. No system whatever has been followed by him in locating his material; not even casual resemblance has been used as a guide. In my last work on the *Noctuidæ*, written in London, and with Mr. Walker's collection before me, I became satisfied that it would take over a year's steady work, glass in hand, to settle all the questions raised by his determinations. Not only have his types to be gone over with his descriptions, but his identifications of Guenée's species have to be compared with that author's writings. Although in Guenée's genera, such as *Hadena*, *Leucania*, *Aplecta*, *Mamestra*, species with naked or hairy eyes, spined or unspined legs, etc., are thrown indiscriminately together, yet some sort of system, i. e., casual resemblance, and often a knowledge of the larva, has been recognized in his work. All this is wanting in Mr. Walker's work; the specimens appear to have been described just as they came along. The genus *Bryophila* is not very hard to recognize; the species are slender bodied with flattened scales on the thorax; yet Mr. Walker describes three American species under this genus all different generically, and none belonging to *Bryophila.* Species belonging to *Agrotis* are described by him, up and down all over the family under all sorts of genera. Some of

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his types are in very bad condition ; and sometimes the condition of the specimen is taken as a specific character. The same species is described in the same drawer several times over. It is absolutely impossible to find out what principle has guided Mr. Walker in his work. If the species had been sorted out just as they came along, and then described, I do not sincerely think the effect would have been much worse ; provided the material had previously been sorted into families. And yet, even here, there are a large number of mistakes. There are plenty of *Bombycidæ* and *Noctuidæ* among his *Geometridæ*. For twenty-five years Mr. Walker's work has been a real obstacle in the way of American Entomologists. Through my different visits a certain number of his species have been made known ; but it is impossible for a private person, with my means, to finish this work. Every day that the British Museum allows Mr. Walker's work, which it published and paid for, to remain uncorrected, it continues to inflict as much injury upon the progress of this branch of science as it is possible to do.

I take this opportunity to thank Mr. Butler for his very kind and welcome assistance in the preparation of my Essay on the North American Noctuidæ, which is being printed in London.

NOTE ON CATOCALA WALSHII.

BY A. R. GROTE.

After a comparison of my types with Mr. Walker's, Mr. A. G. Butler writes me that Walshii *Edw.*, as taken by Prof. Snow in Kansas, is the same as *Junctura* of Walker. The form which has been taken about Albany and which is exactly like *Unijuga*, but differs by the band being a little narrower on hind wings and not quite so continuous, is an unnamed variety of *Unijuga*. It follows from this that my *Arizonæ* is certainly not *Walshii*, as suggested by certain parties. Mr. Neumoegen has received it in quantity from Arizona. The form taken by Belfrage in Texas, and distributed as *Walshii*, may be the same as *Arizonæ*, and should be carefully compared with Arizonian specimens. In any case it becomes now additionally probable that my suggestion that *Aspasia* is a re-description of *Arizonæ* is correct, and if any one will take the trouble to compare the descriptions the reasonableness of my suggestion will become apparent. On account of the pinkish or red hind wings and the brown primaries, both species were naturally compared with *amatrix*. The amount of variation in color of hind wings in this genus is not yet ascertained.

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ON SOME CHALCIDIDÆ.

BY G. H. FRENCH, CARBONDALE, ILL.

In the January number of the CANADIAN ENTOMOLOGIST I described two new species of this interesting family under the names of *Isosoma Allynii* and *I. Elymi*. Professor C. V. Riley, to whom a pair of the first were sent, writes me that they belong to the genus *Eupelmus* instead of *Isosoma*. From a re-examination of my specimens I think he is correct, and the species will be known as *Eupelmus Allynii*, instead of as first described. They have 11 joints to the antennæ, and the prothorax short.

Since writing the descriptions above referred to I have had a number of wingless insects hatch from my wheat straws, and it is now evident that the description of chrysalids, and perhaps larvæ, as given under *Isosoma Allynii*, can not apply to that species, but to these wingless specimens. In a recent letter Professor Riley states that he has bred wingless specimens of an *Isosoma* from wheat received from Kentucky, and it is probable these are the same. I am inclined to think they belong to *Isosoma Elymi* that I obtained from the stalk of *Elymus Canadensis*, though it will be difficult to say positively without more specimens of *Elymi* or winged specimens of the other. The wingless ones are from .10 to .11 of an inch long, inclusive of ovipositor, while the winged *Elymi* I have is .07 of an inch. Premature development might account for the difference. They agree in the following points. Both have 9-jointed antennæ with whorls of hairs at the base of the joints, the antennæ black except the base, which is fulvous, the darkest in the winged specimen. The legs have the femurs and tibiæ fuscous, the joints fulvous, the feet, all but the terminal joint, brownish yellow. Abdomen jet black, the ovipositor and hairs brownish, the hairs arranged chiefly at the sutures of the joints. Head and thorax dull or brownish black, coarsely punctured, the eyes piceous, a fulvous spot on dorsum and sides of the prothorax and similar marks under the thorax. Where there are light markings those on the wingless specimens are a little paler than the corresponding ones on the winged specimen from which my description of *I. Elymi* was taken.

On the other hand, I have now (Feb. 9) larvæ inside stalks of *Elymus Canadensis*. Will they produce *I. Elymi* or something else? Rearing them to the imago will alone tell, and that may help to settle the other

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question. I may say in conclusion that I have bred a specimen of *Eupelmus Allynii* from a gall that was probably made by *Isosoma Hordei*, hence there is a probability that the specimens I bred from the wheat stalks were parasitic on the larva of our wingless *Isosoma*.

NOTES ON CERTAIN BUTTERFLIES, THEIR HABITS, ETC.

No. 2.

BY W. H. EDWARDS, COALBURGH, W. VA.

8. On Young Caterpillars Eating their Egg Shells.

Mr. Scudder, Butterflies, p. 101, says, after describing the way in which the caterpillar eats out of the egg: "The taste he has gained of egg-shell seems to allure him; for, strange as it may seem, although placed by the provident parent within immediate reach of choice and succulent food, *he will not taste it until he has devoured the last remnant of his prison-walls.* Strange food this for a new born babe! The act, however, is plainly a provision of nature by which the tender animal is rid of a sure token to his enemies of his immediate proximity." Surely here is an error in fact, and a wrong conclusion whatever the fact may be. I read the above statement on the 25th July last, and at once went to my garden to search for eggs of Libythea *Bachmanni*, on Hackberry leaves. The young caterpillars of this species are green, of a shade so near that of the leaves they feed on, that it is very difficult to discover them. Even where the tip of the leaf has been eaten, and their presence is suspected, it is easy to overlook them. I found at once three eggs and one young caterpillar. The egg from which this caterpillar had come was present at the base of the leaf on the extreme tip of which the little creature rested. A hole was in its side near the top, and no more had been eaten than just enough to permit egress. Repeatedly, in the next succeeding days, I found egg-shells of *Bachmanni*, each with an opening like that described, and usually, on the leaf above was the caterpillar. So that here is one species which does not devour the last remnant of its prison-walls—perhaps no part thereof. And instead of ridding itself of a sure token of its presence to its enemies, quite the contrary happens, for the empty shell left at the

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base of the leaf is a token by which an enemy, or a good friend in the form of an industrious naturalist, may find it.

The fact is, so far as my observation goes, and besides what I had noticed in a general way for years, I paid particular attention to this matter of eating the egg shells for the rest of last season, caterpillars very rarely eat up the shell so completely that one cannot discover some remains of it. Papilio *Ajax* usually leaves that part which is cemented to the leaf. The Graptas nibble about the tops a little, but leave the greater part of the shell. Lycaena *Pseudargiolus* eats its way out at the depressed summit, and sometimes eats a little of the upper part of the shell. I had two score eggs of two species of Lemonias, viz., *Palmeri* and *Nais*, which came last summer from Arizona, giving caterpillars after they reached me. In every case the egress was by a round hole bitten out of the top, as in Lycaena (the eggs much resembling Lycaena in shape), and the caterpillar could scarcely squeeze through, so small was it. Not a bite from the shell was taken afterward.

As to why caterpillars eat their egg-shells at all, an eminent authority writes: "It is to save the labor of building up new chitine, that substance being here at hand in the shell."

9. On the Appearance of Albinic Females of Colias Philodice.

Mr. Scudder, in same work, page 183, says: "It is a curious fact that *these pale females never appear in the early spring brood*, and increase in proportion as the season advances. This is in harmonious contrast with the occurrence of a melanic male in the spring brood of Lycaena *Pseudargiolus;* when we consider that albinism is a northern, melanism a southern peculiarity, we should anticipate albinism in the cool, melanism in the hot season."

In Butterflies N. A., vol. 2, text of Colias *Eurytheme*, I speak of albinic females of that species: "Albinic females appear in every brood, as in *Philodice*. In that species *(Philodice)* these females are as common in the early spring brood as in any of the later ones; and judging by the number of albinos received by me from many quarters, the same is true of *Eurytheme*." In case of *Eurytheme*, the distinction between the spring form *(Ariadne)* and the later forms *(Keewaydin* and *Eurytheme)* is so marked, that an albino specimen received can be allotted to one or the other with certainty. There is not such distinctness between the early and late broods of *Philodice*, and my statement on the occurrence of

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albinic females in spring was based, not on dried specimens, but on personal observation. Such females are seen by me here, at Coalburgh, every spring. I took one in my net early in 1881, thinking before I struck it that it was a large P. *Rapae*, and same day I saw another. In my note book I recorded, 1874, 8th May, that I took an albino female *Philodice*. But as it might be said that albinos were to be expected at the south, but still were not to be found at the north, I wrote Mr. Lintner for such information as he could give on the matter. He replied, 27th July, 1881; "I was at Albany yesterday and a friend showed me a beautiful white female *Philodice* taken near Centre, on May 15th. On 20th June, he took six more." So that albinic females do appear in the early spring brood, in New York as well as in West Virginia, and the foregoing generalization is erroneous.

10. Upon Certain Alleged Peculiarities in the History of SATYRUS ALOPE.

Mr. Scudder says, l. c., page 132, it "first appears on the wing in the early half of July. . . . The females live a long while before depositing a single egg; the earliest record I have of this event is the 22nd of August, or *from five to six weeks after the first appearance of females;* they continue to lay eggs until the end of the first week in September; *and in keeping with the indolence of the females* is the duration of the egg state—from 3 to 4 weeks, a period longer than in any butterfly known to me where the eggs hatch at all the same season. The earliest caterpillars therefore appear by the middle of September," etc. I spent some time at Martha's Vineyard, Mass., in July, 1877, at Oak Bluffs, and on the grassy plains back of the town I searched daily for butterflies. The first *Alope* seen were 2 males, and they were just from chrysalis, 23rd July. On 26th, the first female was seen, and I took 12 ♂, 1 ♀. I then left the Vineyard and Mr. Mead came there just at that time, and set to work to obtain eggs of *Alope* for me. On 10th Aug., or 15 days after the first female had been seen by me, he began to shut up females in a bag over a plant of grass in a tin can, and 22nd Aug., at Coalburgh, I received from him 125 eggs, laid prior to Aug. 18th. These began to hatch 27th Aug., or 17 days after the first female was enclosed. This certainly is not a long period for the egg as compared with some other butterflies, especially the large species of Argynnis. The period of A. *Cybele* I have found to run from 12 to 24 days; of A. *Diana* 15 to 26; A. *Idalia*, 25; A. *Alcestis*, 27

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and 29 days. On the other hand, I have had eggs of *Alope* and *Nephele* from several localities, and the periods of this stage have run from 14 to 28 days. It depends much on the weather how long the egg period shall be, whether it be a Satyrus or Argynnis egg, and it is hardly right to charge the females of *Alope* with special indolence of habit. Their eggs are laid, so far as my observation goes, as soon after emergence of the female from chrysalis, as are the eggs of the larger Argynnids, and hatch as speedily.

11. On Eggs of THECLA CALANUS.

It is stated, l. c., page 128, that the eggs of *Calanus* "are laid towards end of July and early in August; *these eggs remain unhatched until the following spring*, when the caterpillar emerges, feeds on oak leaves, changes to chrysalis in June and July, and after a fortnight the butterflies of the new year appear." I should much like to see evidence to support this statement. Mr. Saunders, at London, Canada, Can. Ent., vol. 1, p. 57, says of this species, which he calls by its synonym T. *inorata* G. & R. (= T. *Falacer* B. & L.): "About the middle of July, 1868, two eggs were deposited on the sides of a pill box. This box was overlooked for several days, and when examined again, the larvæ were found to have escaped and dried up for want of food."

Mr. C. E. Worthington, at Chicago, writes me: "I took examples of *Calanus* the last days of June, and confined on a branch of oak. The eggs were laid, and hatched during the first week in July, and the larvæ died a few days after. *Calanus* is our commonest species. My memoranda of captures are June, July, September."

It is certain then that *Calanus* eggs laid in June and July hatch in a few days, in Canada and Illinois, and that in the latter the species is double-brooded. If eggs are laid in September, they may possibly hibernate, or the caterpillars may, or the chrysalis, and to this date apparently no one knows which of these stages hibernates. My opinion is that it is the chrysalis, as with other American species of this genus.

12. On the Number of Larval Segments.

Authors have recognized 13 segments, counting the head as one (*vide* Burmeister, Westwood, &c.) Mr. Scudder, page 17, says: "The body, or the portion of the caterpillar *lying back of the head*, is composed of thirteen segments." I find no explanation of this thirteenth segment, nor

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directions where to look for it. It does not appear to be visible. Twelve after the head are distinctly seen in all the large lepidopterous larvæ, and any one can satisfy himself of that if he will examine a caterpillar of one of the large Bombycidæ or Sphinges. The segments are distinct in many butterfly larvæ, as for example, *D. archippus*. Now on page 82, Mr. Scudder gives a magnified figure of the larva of *Archippus* from Burgess, in which the thoracic segments are numbered 1 to 3, and the abdominal 1 to 9, making 12 without the head. On page 19 we read: "Among the butterflies these appendages (pro-legs) are always borne by the 3rd to the 6th abdominal segments, and by the last segment, leaving thus a *similar space without support between the true and false legs, and between the terminal and preceding false legs.*" Plainly this accounts for but 12 segments, as these "similar spaces" are two segments in each case. Three thoracic, bearing legs, 2 segments "without support," 4 with false legs, 2 more "without support," and the "terminal" segment. That is 12. I should have regarded the statement that there were 13 segments without the head as an error of the printer; but on page 239, the author undertakes to conceive a picture of the primeval butterfly, and says: "The caterpillar had a rounded head, a body composed of 13 segments," &c. Therefore I should like an explanation, and a hint as to where one is to look to find this 13th segment. It is hardly necessary to count segments which are invisible to the naked eye.

13. On Apaturas "Herse" and "Lycaon."

In 1833, Boisduval and Leconte, in Lep. de l'Amer. Sept., described and figured two species of Apatura as *Celtis* and *Clyton*, and for more than a generation these names were unchallenged. In 1869, Mr. A. G. Butler, in his Catalogue of Di. Lep., described by Fabricius in the Collection of the Brit. Museum, introduced *Lycaon* ♂ and *Herse* ♀, Fab. Ent. Syst., as of one and same species, and remarked: "This species is well figured in Jones's unpublished 'Icones'; it comes very near a new species figured by Mr. Edwards" (A. *Alicia*). All that Fabricius himself knew of these species was from the drawings, so far as appears, and his description is taken directly from the drawings. What part of the globe the butterflies came from he did not know, as in both cases he says "Habitat ——."

In 1871, Kirby's Catalogue followed Butler, giving *Lycaon* as ♂, *Herse* as ♀, of one and the same species, but not one identical with either *Celtis* or *Clyton*. In this Catalogue, *Lycaon* stands No. 34 and *Celtis* No. 38 in

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the series, two tropical species intervening with others. No locality is given for *Lycaon* and *Herse*, as it was not known by Kirby what part of the world they came from. Since the time of Fabricius, 1793, these drawings had never been fixed on any living species.

In 1872, 39 years after Boisduval and LeConte had figured *Celtis* and *Clyton*, during all which period their names had stood unchallenged, Mr. Scudder, in his Systematic Revision, first connects Jones's figures with our N. Am. species, making *Clyton* to be identical with *Herse* and *Celtis* with *Lycaon*, differing completely, as is seen from both Butler and Kirby. They regarded these drawings as meant to illustrate two sexes of one species, but that one neither *Clyton* nor *Celtis*. Mr. Scudder asserts them to illustrate two distinct species, with no explanation allotting one to *Clyton*, the other to *Celtis*. Now *Clyton* and *Celtis* belong to two well marked sub-groups, and it shows the utterly worthless character of the Jones drawings for identification of species, that such an authority as Mr. Butler should regard them as representing the two sexes of one species, and that Mr. Scudder should, on the contrary, think they represented two species of distinct sub-groups.

In 1874, Mr. Riley, 6th Mo. Report, gave admirable wood-cuts—as his manner is—of both our species, but unfortunately, followed Mr. Scudder in perpetuating the errors I have spoken of, and that evidently out of deference to Mr. Scudder's supposed means of information. He says that "for forty years the species have been known as *Celtis* and *Clyton*, and he regrets that some time should not by agreement be fixed, say a quarter of a century, after which an insect which has been universally designated by a particular name, should not be called on to change its name evermore, no matter what prior name might turn up. But as no such rule exists, he thinks the quickest way to get rid of the confusion now attaching to the specific nomenclature *is to follow Mr. Scudder, who has given the matter so much attention.*" If I am not much mistaken, Mr. Riley would not give that advice to-day. I do not suppose Mr. Scudder ever saw *Celtis* and *Clyton* alive—as they are not New Englanders—and all that he knew of Jones' figures was learned by a cursory inspection of them at Oxford at some time during his travels. That unlucky inspection has been the cause of a great deal of trouble.

I had occasion to figure *Celtis* and *Clyton* in Vol. 2, But. N. A., Parts 3 and 5, and I obtained, by the kindness of Prof. Westwood, colored copies made by himself of both surfaces of *Herse*. Mr. Riley, after his

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paper was written, had also obtained from the same source uncolored tracings of both *Herse* and *Lycaon*, which he permitted me to see. Mr. Butler had himself examined the drawings and wrote me, he still regarding them as representing two sexes of one species: "It is certainly not *Celtis*, which I know well." Now Mr. Butler's testimony was of itself sufficient to settle this matter.

I first saw the tracings spoken of through Mr. Riley, and in my Part 3, I say: "I entertain not a doubt that they were meant to represent *Idyja*, or a species allied to that." There are certain well marked peculiarities in the arrangement of the spots in *Idyja* to be found roughly done in the drawings, and herein *Idyja* differs from either of our two species. I copied Fabricius' description of *Lycaon* (drawn up from Jones), and compared it line for line with the appearance of *Celtis*, and made it plain that the description of one could not apply to, and could not have been meant for, the other, whether as to coloring or markings.

When I wrote the text of *Clyton*, Part 5, a year later, I had Prof. Westwood's colored copies of *Herse* before me, and I showed that Fabricius' description of *Herse* could not possibly relate to *Clyton*. I gave wood cuts of the under sides of *Herse* and *Idyja* (a West India species whose nearest allies are to be found in tropical America), and the resemblance in the arrangement of the spots between these two was as unmistakable as was the difference between either and *Clyton* or *Celtis*. If Jones did not have *Idyja* before him he certainly had a species of same sub-group. But what that species was it is impossible to say. Surely it is quite time that Fabricius' names for Jones' figures should drop into their original obscurity. Nevertheless here they stand in Mr. Scudder's "Butterflies," 1881, as if their claims were established, or had never been denied, and the names properly belonging to the species are put down as synonyms!

14. On COLIAS CHRISTINA Edw.

In Mr. Strecker's Catalogue, p. 81, Colias *Christina*, a well marked orange species, figured in Vol. 1, But. N. A., is set down as a var. of C. *Pelidne* Bd., a yellow species which I should say was at a considerable distance in a series; and in various other publications Mr. Strecker has expatiated on this supposed discovery. *Pelidne*, with its var. *Christina*, stands as No. 54 in his series. Colias *Occidentalis* Sc. is quite as strangely put down as a var. of C. *Philodice*, a species for which it has but a slight

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affinity, and *Philodice* stands No. 58 in his series, *Alexandra*, *Emilia* and *Barbara* intervening between it and *Pelidne*. And C. *Scudderi* is given as a synonym of *Pelidne*, not even worthy to be called a variety.

Being recently in New York, I saw in the collection of Mr. Henry Edwards several examples of what Mr. Strecker had sent him as *Christina* from Hudson's Bay, where this complication of species is said to be the normal condition. These examples embraced ♀ *Scudderi*, ♂ ♀ *Occidentalis*, and no *Christina* at all!

While on this subject, I may as well add that C. *Barbara*, H. Edw., spoken of above, stands as a good species in Strecker's Cat., No. 57, and C. *Harfordii*, H. Edw., is put as a var. of C. *Chrysotheme*, No. 60, although the latter is not an American species. It is however an orange species, whereas *Harfordii* is a yellow one, and *Harfordii* and *Barbara* are really one and the same thing. Mr. H. Edwards suggested this in a paper in Proc. Cal. Acad. Sci., 17th June, 1878, and he informs me that he is at present fully satisfied of the identity. After inspection of the specimens in his collection I agree with him.

MIGRATION OF DRAGON-FLIES—*Aeschna heros** (Fabr.)

BY A. H. MUNDT, FAIRBURY, ILL., LIVINGSTON CO

On the evening of August 13th, 1881, I observed them between the hours of 5 and 7 o'clock. The air for miles around seemed literally alive with these dragon-flies, from a foot above ground to as far as the eye could reach, all flying in the same direction, a south-westerly course, and the few that would occasionally cross the track of the majority could all the more easily be noticed from the very regular and swift course they generally pursued; but even these few stray ones would soon fall in with the rest again. Very few were seen alighting, and all carefully avoided any movable obstacles.

The next day very few were seen on the prairies, and these mostly of another species very abundant in this country, *Anax junius* (Drury), which were probably at home previously, and in a few days I could see none others but the latter. A few newspapers, and also a few correspond-

* { *Œschna heros*, Fabr.
{ *Æschna.*

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ents from twelve to fifteen miles east and west of here, had observed and mentioned their flight. Although their course was precisely in that direction, Prof. Forbes, of the State Normal Museum, writes that "no observations had been made there regarding the migrating of this insect," and he kindly identified the last named species for me; however both have been carefully looked up and identified as being separate, by other well informed Entomologists, all agreeing with me that the above names are correct.

Whether their migrating was instinctive, or forced by the Manitoba wave, then reported in Chicago papers as having arrived in that direction, after a spell of very warm weather; or caused by the dry season, the ponds having become so exhausted as to afford no pasturage for their larvæ, seems a matter of conjecture; most likely the latter, however, as the cold wave reached here but very slightly.

NOTES ON LAST YEAR'S COLLECTING.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

No one I think can have been long engaged in collecting insects without having noticed the remarkable diversity in the products of different years, not only in quantity, but in kinds. Each summer seems to bring its own particular species to the front, so that if a person wishes to get a moderately correct idea of the insects of any locality, it is necessary for him not only to hunt diligently all the season, but every season for a considerable length of time; and if he has from any cause missed one, he may be sure he has missed something which it may be years before he will again have an opportunity of securing, or securing in the same abundance. The causes of these variations seem as yet to a great extent a mystery.

Insect hunting could not be said to be good in this locality last summer. It might be considered very poor, yet it produced its new things for the collection, and some things in plenty which had hitherto been scarce. On the 12th of May I came across some specimens of a Pieris which I thought were poor specimens of *oleracea*, but which Mr. Edwards determined to be *Virginiensis*. On the 23rd I took a very attractive Chrysomela, which is in the Society's Coll. in London as *C. labyrinthica*, but which the authorities say is *multiguttis* of Crotch's Check List, of which

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scalaris is a synonym. Rather remarkable, surely, that so handsome and distinctly marked an insect should not have a name of its own. Its season lasted about four weeks, during which I secured over a dozen. I took one specimen of *Stenosphenus notatus* Oliv. Of this species I captured in May, 1879, three specimens, the first I ever took, and that year, a week or two previous to my captures, I received from Mr. Reinecke, of Buffalo, a pair labelled Dallas, Texas. They are exactly similar. The Cerambycidæ were ten days later than usual this year. *Goes debilis* was numerous, and I took my first and only specimen of *S. pulcher*. *Saperda discoidea*, although never plentiful, is interesting from the great difference in size and markings of the sexes. I had always found two or three females to one male until last season, when the males were most numerous. There were several species of Leptura quite common, especially *vibex*, which I had not seen before. *Gaurotes cyanipennis* was in great abundance, but although you could bring a dozen down with one stroke, you might not secure more than two or three, they were so quickly on the wing again. The months of July and August were barren of anything worthy of note. In the second week of September the fall moths began to appear, and up to the end of October were quite plentiful. Those attractive genera, Scopelosoma and Lithophane, were more fully represented than I had seen them since the fall of 1877, when I took eight or ten species for the first time. A few *S. Graefiana* and *L. Bethunei* can be found every year, but *Scopelosoma Pettiti* and *ceromatica*, and *Lithophane semiusta*, *pexata*, *signosa*, *petulca*, *querquera*, are rare. Some of these choicer species were easily secured again last fall. I also took one new to me, *L. ferrealis*, whilst a friend here, Mr. J. Johnston, took *S. tristigmata* and *L. cinerosa*, which we were enabled to identify through the kindness of Mr. R. Thaxter, of Cambridge, Mass. Mr. Kyle, of Dundas, secured *L. Georgii*, which I have not yet met with. It may be worthy of note that Mr. Johnston took a specimen each of *Plusia striatella* and *Chærocampa tersa*, the first taken here of either species.

Mr. Thaxter kindly determined the following for me:

Dryopteris rosea,	Hadena Miselioides,
Limacodes inornata,	Dianthoecia meditata,
Gortyna cerina,	Orthodes cynica,
Calledapteryx dryopterata,	Paristichtis perbellis,
Mamestra eloniplina.	

The last four were taken the previous year at Long Point.

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CATOCALÆ TAKEN IN THE VICINITY OF FRANKFORD, PENNSYLVANIA.

BY JAMES S. JOHNSON.

NAME.	OCCURRENCE.	CAPTURES.	EARLIEST CAPTURE.	LATEST CAPTURE.	DURATION, DAYS.	FOUND ON
Epione.	Not common.	Every season.	July 10, 1880.	July 28, 1881.	19	Oak and chestnut.
Lachrymosa.	Rare.	3 specimens.	Sept. 4, 1877.	Sept. 7, 1881.	4	Oak.
Obscura.	Not common.	Every season.	July 10, 1880.	Sept. 27, 1881.	18	Hickory and oak.
Angusii.	Rare.	5 specimens.	Sept. 3, 1880.	Sept. 7, 1881.	5	White and black oak.
Var. Lucetta	Rare.	3 specimens.	Sept. 3, 1880.	Sept. 8, 1877.	6	" "
Ulalume.	Rare.	1 specimen.		Sept. 27, 1881.		Black oak.
Insolabilis.	Not common.	Every season.	July 8, 1880.	Sept. 8, 1881.	63	Hickory and oak.
Robinsonii.	Not common.	Every season.	Aug. 10, 1880.	Sept. 27, 1881.	49	" "
Viduata.	Very rare.	2 specimens.	Sept 5, 1877.	Sept. 7, 1881.	3	Black oak and elm.
Retecta.	Not common.	Every season.	July 19, 1880.	Sept. 10, 1881.	54	Oak, hickory & chestn't
Flebilis.	Not common.	Every season.	July 26, 1877.	Sept. 27, 1881.	64	" " "
Desperata.	Common.	Every season.	Aug 9, 1877.	Sept. 19, 1881.	42	" " "
Tristis.	Rare.	5 specimens.	July 14, 1877.	July 21, 1877.	8	Tulip, poplar and oak.
Judith. Levettii.	Rare.	Every season.	July 9, 1880.	Aug. 23, 1881.	46	Shell-bark hickory.
Cara.	Not common.	Every season.	Aug. 6, 1880.	Sept. 13, 1880.	39	Oak and old stumps.
Amatrix.	Common.	Every season.	Aug. 9, 1880.	Oct. 10, 1877.	63	Beech, maple & willow
Var. Nurus.	Common.	Every season.	Aug. 17, 1880.	Oct. 10, 1877.	55	" " "
Cocinnati.	Very rare.	3 specimens.	July 14, 1880.	July 23, 1877.	10	Beech.
Unijuga.	Not common.	Every season.	Aug. 28, 1881.	Sept. 21, 1877.	25	Beech and willow.
Marmorata.	Very rare.	1 specimen.		Sept. 6, 1881.		White oak.
Parta.	Not common.	Every season.	July 21, 1877.	Oct. 10, 1877.	82	Beech, oak and willow.
Ultronia.	Not common.	Every season.	July 8, 1880.	Aug. 23, 1881.	47	" " chestnut.
Concumbens.	Very rare.	1 specimen.		Aug. 16, 1877.		Beech.
Ilia.	Common.	Every season.	July 1, 1880.	Sept. 10, 1881.	72	"
Innubens.	Rare.	7 specimens.	Aug. 10, 1877.	Aug. 31, 1877.	22	" and chestnut.
Var. Scintillans.	Very rare.	2 specimens.	Aug. 18, 1877.	Aug. 29, 1877.	12	" "
Piatrix.	Not common.	Every season.	Aug. 10, 1877.	Sept. 6, 1881.	28	Walnut and oak.
Subnata.	Rare.	Every season.	July 14, 1880.	Aug. 22, 1881.	40	Beech.
Neogama.	Common.	Every season.	July 10, 1880.	Sept. 27, 1881.	80	" and oak.
Paleogama.	Common.	Every season.	July 11, 1880.	Sept. 19, 1881.	71	" "
Var. Phalanga	Rare.	Every season.	July 16, 1880.	Sept. 8, 1881.	55	" "
Nebulosa.	Very rare.	4 specimens.	July 26, 1877.	Sept. 27, 1881.	64	" "
Serena.	Not common.	Every season.	July 11, 1880.	Sept. 8, 1881.	60	Shell-bark hickory.
Habilis.	Common.	Every season.	July 25, 1880.	Sept. 27, 1881.	65	Oak, hickory & chestn't
Cerogama.	Not common.	Every season.	Aug. 8, 1880.	Aug 27, 1881.	20	Oak and beech.
Antinympha.	Rare.	Every season.	Aug. 15, 1877.	Aug. 23, 1880.	9	Under brush and logs.
Grynea.	Not common.	Every season	July 1, 1880.	July 24, 1881.	24	Oak and hickory.
Gracilis.	Not common.	Every season.	July 9, 1880.	July 29, 1877.	21	Oak.
Var. Similis.	Not common	Every season.	July 10, 1880.	July 27, 1881.	18	"
Minuta	Rare.	4 specimens.	July 21, 1877.	July 28, 1881.	8	"
Linella.	Common.	Every season.	July 4, 1880.	Sept. 1, 1881.	60	Black oak.
Androphila.	Common.	Every season.	July 14, 1880.	Sept. 8, 1881.	57	White oak.
Amasia.	Very rare.	3 specimens.	July 24, 1877.	Aug. 6, 1877.	14	"

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The above table was compiled from my diary for the past five years. I notice that the season of 1880 was 8 or 10 days in advance of the others, while 1877, during which there was a harvest, held out the longest. All of the specimens were taken at rest, and the trees named are those on which they were discovered and seemed to select for hiding. It is a singular fact that among the hundreds I have captured, I have never yet found a ♀ Catocala containing eggs.

CORRESPONDENCE.

A CORRECTION.

DEAR SIR,—

In my article which appeared on pages 21–23 of the CANADIAN ENTOMOLOGIST, Vol. xiii, No. 2, the species was erroneously accredited to *Plusia precationis* Gueneé, instead of to *Plusia simplex* of the same author. This mistake on my part was owing to the fact that the moths from which I obtained the eggs had the metallic spots in the centre of the fore wings nearly as they are in a *precationis* which Mr. Grote determined for me. I have been enabled the present season to correct my former mistake by the use of the excellent descriptions of the Plusia moths given by Prof. Cyrus Thomas in his Fourth Report.

On the 21st of November, 1881, I received from the Editor of the Germantown *Telegraph* a box of insects for determination, and in the letter which accompanied the box the Editor stated that the worms which he sent me were very destructive to the celery in many gardens in his locality.

These celery worms agreed precisely with the description of the *simplex* larvæ referred to above. They differ from the larvæ of *brassica*, as given by Prof. Riley, only in having the spiracles ringed with black; and both of these larvæ differ from that of *precationis* by not having a black stripe on each side of the head. In all other respects these three larvæ appear to be utterly indistinguishable.

D. W. COQUILLETT, Woodstock, Ill.

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The Canadian Entomologist.

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NOTES ON PEMPHIGUS TESSELATA, FITCH.

BY HERBERT OSBORN, AMES, IOWA.

SYNONOMY.

Chermes alni Kalm. Travels into North America, English translation, vol. 1, p. 154; p. 121, 2nd ed.

Eriosoma tesselata Fitch. 4th Report State Cab. Nat. Hist., N. Y.

Eriosoma tesselata Glover. Ag. Rept., 1876, p. 39.

Eriosoma tesselata (or *imbricata*) Glover, unpublished plates HOMOPTERA iii., fig. 19.

Schizoneura tesselata Thomas, 8th Report Insects of Illinois, p. 139.

Apparently the first record of this insect is given by Kalm., as cited above, where he says under date of Oct. 3rd, 1748: "I saw to-day the *Chermes* of the Alder *(Chermes alni)* in great abundance on the branches of that tree, which for that reason looks quite white, and at a distance appears as it were covered with mold." This reference, in all probability, is to *P. tesselata*, and the reference to the European species, *Chermes alni* L., a mistake, since there are no later records of the European species being found here, and this one is specifically distinct from the one described by Linnæus.

Dr. Fitch describes the apterous female and states that he had searched in vain for winged individuals. His specimens were from *Alnus rubra.* Mr. Glover states that it was found upon Birch in Maryland. In his unpublished plates he figures the same, referring to it as *tesselata* or *imbricata.*

The newly-born larva is pale brown. The antennæ are 4-jointed, the first joint short, second one-half longer, third and terminal nearly equal and each equalling the first and second together. The dorsal portion of the body is covered with slight elevations which mark the position of the wax-secreting glands. They are arranged in rows, there being three rows on each side in the abdominal segments, except the terminal, which has

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none, and the subterminal, which has two on each side. On the thorax and head they are smaller and fewer in number. Length of body 1.25 m. m.

Apterous viviparous ♀. "Dull bluish black; tergum with the segments marked by strongly impressed lines and covered by white down in square checker-like spots. Length 0.16 in." (4 m.m.) Fitch.

The abdomen is covered by long shreds of down, while the thorax and head are simply covered with whitish dust. Antennæ 5-jointed by division of third (?) joint of larval antenna into *two*, while the second joint has apparently shortened.

Fresh specimens of winged ♀ cleaned in alcohol are described in MS. by Dr. Hagen as "head and antennæ black, prothorax pale dirty whitish; thorax chestnut brown; abdomen pale whitish gray, above with six rows of blackish spots; beneath with four blackish fine lines on each side near the middle, not reaching the tip; legs brown; tibiæ and tarsi paler; wings opaque, veins pale, except the mediana of fore wings, which is brown. Full grown nympha is similar to the imago; the wing coverings are black."

Alcoholic specimens of winged viviparous ♀ were dark bluish black with the white filaments on the abdomen less prominent than in the apterous ♀; head and thorax covered with whitish powder. The antennæ are 6-jointed by division of the third (?) larval joint into *three*, the second joint shortening; joints 3–6 are marked with transverse irregular interruptions lined with a thin membrane, while the terminal and subterminal joints contain sensitive glands, as do also these joints in the larva and apterous ♀. Length 4–5 m.m. Expanse 10–12 m.m.

The sensitive glands of the antennæ, which may be seen in the terminal and subterminal joints, are cavities or funnel-shaped openings in the crust, which are lined by a membrane which expands in the middle into a glandular body from which arise from two to four papillæ. In some cases within the border of the cavity can be seen minute ciliæ forming a fine fringe. These organs undergo but little modification during the metamorphoses of the insect. They are prominent in the embryo taken from the viviparous female. In the adult, however, they are partially obscured by other irregularities in the surface. In the winged individuals, where the antennæ are 6-jointed, the terminal joint has at tip five short papilla-like spines, and a little below these four slightly granular elevations, immediately beneath which is an interrupted space in the

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crust, and at one side of this a cavity containing a papilla; the surface of the joint is broken below this in two places by irregular interruptions in the crust, which appear to be lined by more delicate membrane. It is also somewhat roughened and thrown up in places in transverse ridges or elevations; a few hairs also pass from round openings in the crust. The subterminal joint has very near the end a large opening through the external coat, and within this three large glandular bodies which bear papillæ. Other open spaces are to be seen along the joint, but no glands. The fourth and third joints have also irregular transverse interruptions in the crust, but no papilla-bearing glands.

The papilla-bearing bodies in the last two joints must certainly be organs of sense, though I have not been able to satisfactorily show their connection with nerves. A delicate thread, probably a nerve, can in some cases be seen running through the joints, but preparations from fresh specimens will be necessary to establish its character and connections. The delicate membranous coverings of the transverse irrorations in the crust seem also well adapted to receiving impressions, but their connection with nerves is still undetermined.

The labrum is a slender conical projection beyond the clypeus from which its separation is indistinctly marked, since it contains but little chitinous structure. It is channelled on the under side to near the tip, and from this channel the setæ forming the sucking tube pass in a regular curve into the channel of the labium.

The superior setæ (mandibulæ) spring from cones which originate with chitinous arcs each side of the opening of the œsophagus; passing forward, they unite immediately in front of the hypopharynx and within the paraglossæ. The inferior setæ (maxillæ) arise from similar cones which lie beneath based upon chitinous structure lying at the superior posterior portion of paraglossal bases. They unite with each other and with the superior setæ at the union of the latter, and pass with these between and in the channel of the paraglossæ, and thence into the groove of the labrum. The paraglossæ are short and setaceous, arising from an inferior lamina which rests upon the base of the labium. The labium is *4-jointed* and reaches nearly to the end of the body in the larva, but only beyond the first pair of legs in the adult; the tip is surrounded by numerous hairs and a row of bristles extends each side of the groove. Immediately in front of the œsophageal opening appears a denser portion, the epi- and hypo-pharynx, extending to the union of the setæ, and within

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this, forming a central row, are eight spots, light in the centre with dark borders, becoming entirely dark with more superficial focussing; apparently these lie immediately above the channel formed by the epi- and hypo-pharynx leading to the gullet.

In *Cicada* the epi-pharynx, which forms the under surface of the clypeus, is channelled, and the edges of channel are raised into two strong arches. In the central portion of this channel is a double row of ten spots similar to those described in *P. tesselata*, and back of these in a direct line toward the pharynx is a sac-like organ apparently with an opening into the channel and with a delicate tube leading from its neck, and within its boundaries two clusters containing four spots each, lying one on each side of the median line.* These spots are very similar to structures that I have examined which are similarly located in the honey ant, and which evidently correspond with the sense organs of the honey bee described as located here.

These organs, which seem never to have been described in Hemiptera heretofore, are present in such Hemiptera as I have been able to examine, and when fresh specimens are at hand, it is hoped that their structure and office may be more fully determined. It seems most probable, however, that they are organs of sense, and their location would warrant the belief that they may be connected with taste, though they may be connected with smell instead, or it is not impossible, owing to the close relation of these senses even in the highest animals, that they might perform a double office. The wax-secreting glands located on the dorsal surface of each segment consist of circular groups of large pavement cells disposed beneath the epidermis.

Prof. Thomas, in his work on Aphididæ (8th Rept. State Entomologist of Ill.), places this species in the genus *Schizoneura*, but following the venation of the wings according to which the genera are divided, it cannot be placed in this genus since the third discoidal vein is not forked, while in other characters, as well as this, it agrees with *Pemphigus*.

The venation, however, is not constant, for in examining the wings of over thirty specimens, one was found in which the third discoidal of the front wing was distinctly forked, while in one other the second oblique of the hind wing was forked.

* Can this structure be analogous to the "taste goblets" which are found in the fungiform and circumvallate papillæ of the human tongue?

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The hooklet which attaches the hind wing to the front one is composed of five pieces side by side, like the fingers of a hand. It fits into a fold of the hind border of the front wing, which lies at the termination of the first discoidal vein.

The observations here recorded were made during the past winter in the Cambridge Museum of Comparative Zoology, while studying under the direction of Dr. H. A. Hagen, to whom I am under lasting obligations for valuable aid and for the use of material and books with which to pursue my work.

REMARKS ON THE GENERIC CHARACTERS OF THE NOCTUIDÆ.

BY JOHN B. SMITH, NEW YORK.

"I can get along very well with the Butterflies, and I know something about Beetles, but the *Noctuidæ* were always a great puzzle to me." So writes one of my correspondents, and to the same effect are expressions, both oral and written, from nearly all the collectors I have had any acquaintance with. And yet there is no good reason why the *Noctuidæ* more than the other families or groups should be considered so very difficult. True that the species are often very closely allied, and true also that there is often more difference between variations of one species than there is between valid (so considered at present) species. Yet there are many excellent characters in the *Noctuidæ*, easily recognized and readily discerned, which make the placing an unknown species into its proper genus a task of little difficulty

The truth is that the *Noctuidæ* are not so difficult a group *per se*, but the sources of information concerning it are so various, so difficult of access, and so foggy when they have been discovered, that even if the student happens to know the language in which his work is written, the information derived scarce repays the trouble bestowed upon the search. Later writers have done little to lift the veil which concealed knowledge from the eyes of others. Species there have been described in very large numbers, and genera have been created with exceeding great liberality, and the result is that the beginner is appalled at the chaos which confronts him in Entomology, and takes to Botany or some other branch of natural

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science about which something seems to be known. Many of the writers of the present decade also seem to find their greatest delight in accusing those whose misfortune it is not to agree with them, of ignorance, either of the literature of the subject, or of anatomy, or something else equally heinous. A knowledge of the literature of the subject is, I admit, an accomplishment not everyone can boast of, but a knowledge of the anatomy of a Noctuid is a thing that any one can acquire in a very short time. All this has nothing particular to do with generic characters, but it was necessary to say a few words to explain why the following dissertation was written, and I will now proceed with my subject.

A good, concise definition of the group *Noctuidæ*, which shall include all the forms belonging to it, and exclude everything not so referable, is still one of the *desiderata*, and I am not able at present to supply it. As good a one as it is possible to get within a short space is the following from the preface of my synopsis of the genera :

The Noctuidæ are as a rule robust, seldom slightly built moths, with comparatively small, stiff wings, which, except in *Tortricodes bifidalis*, are entire ; the ocelli are nearly always present, and the wings have simple discal cells, two free veins at inner margin of secondaries (counted as one by the German Entomologists), and one at inner margin of primaries; the latter usually have also an accessory cell at the upper angle of the discal, sometimes separated from it by a short stalk. The antennæ are bristle-form, generally simple in the female and pectinate or ciliate in the male.

Commencing at the head, the characters used in generic divisions are as follows :

The *eyes*, as to clothing, are either entirely naked, naked and fringed above and below, and sometimes at the sides, with hairy or bristly lashes, or entirely hairy—a single hair usually arising from the angles of the facets of the compound eye. These differences have a very great generic value, and two genera separated only by one or the other of these characters would be valid.

In form the eyes are either hemispherical and very strongly convex, rounded and somewhat flattened, elongate oval, or reniform. The degree of convexity or the size have no, or only a slight, generic value, but an insect with reniform eyes would be generically distinct from a round-eyed one.

The *ocelli* are usually present, but are lacking in a few genera ; in this group lack of ocelli suffices for generic separation. When present they

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are found close to the compound eye, and behind the base of the antenna. Usually they can be distinguished without denuding the head, but occasionally they are so small, and the vestiture of the head is so thick, that a part of it must be removed before the presence of the ocelli can be positively determined.

The *clypeus* is variously modified; usually it is smooth, moderately convex, and without any special peculiarity. In some cases, however, it becomes prominent, bulging out between the palpi, and this convexity has occasionally a concave depression in front, and in this depression again are tubercles, conic protuberances, etc. In other genera a conic tubercle adorns the clypeus; sometimes there is a cylindrical projection, and sometimes the projection is flattened; in one genus *(Nonagris)* bifid in front. Occasionally the "infra clypeal plate" is produced, forming a flattened shelf-like projection, usually squarely cut off before. These projections are often partially or entirely concealed by the vestiture, but can in all cases be readily demonstrated by touch with a fine pin. As to the generic value of these modifications, there is considerable difference of opinion. For my own part, I consider them as having only a slight value, and as not being sufficient in themselves to separate genera. The genus *Cucullia*, for instance, has in some species a normal clypeus, in others a convex projection, and in others a depression in this convexity. *Arzama* has in some species a conic tubercle, which is lacking in others; so that genera distinguished by clypeal differences only should be cautiously created, and no genus based on the presence, absence or form of a tubercle situated in a depression of the clypeus, should have any standing.

The *tongue* varies somewhat in consistency and length. Sometimes it is almost obsolete, as in *Cleoceris* and *Euthisanotia*, but usually it is long, strong and corneous, coiled between the palpi. Genera may be properly based on the extremes of length and consistency of the tongue, but mere variations in length do not authorize them.

The *palpi* vary greatly, and genera are very largely based on their modifications. In the typical *Noctuae* they are of moderate length, the second joint generally longest and always heaviest, and the third joint usually small and slender, and sometimes so small as to be obsolete. They are usually curved upward, closely applied to the head, and generally reach to the vertex. Sometimes they are so short as to be practically obsolete, and then again they exceed the head by half the length of the entire insect (§ *Deltoidæ*). Sometimes they are porrect and closely scaled,

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having the terminal joint nearly as long as the second (*Catocala*). Sometimes, as in *Plusiodonta* and in some species of *Plusia*, the terminal joint is exaggerated, reaching far above the head. In some genera they are oblique and heavily fringed beneath, broadening toward the tip (*Basilodes*); then again they project forward horizontally, sometimes, in conjunction with the pointed frontal tuft, forming a snout (*Scolecocampa*). In *Herminia*, *Hypena* and some others, the second joint is disproportionately long and fringed above with upright scales or hair, while the terminal joint is short and slender. Sometimes they are curved upward, sickle-shaped, nearly reaching the base of the thorax and closely scaled. Mere differences in the length of the palpi or in the proportions that their joints bear to each other, do not authorize generic distinctions, if the general form remain the same; but insects having the palpi practically obsolete could not be considered congeneric with those having them well developed; nor could an insect with porrect palpi be placed with one having elongate horizontal palpi; and this in turn could not be united with one in which they were sickle-shaped and curved upward. Variations in the position of the terminal joint, whether vertical, drooping or otherwise, do not authorize a generic distinction.

The *antennæ* are very variable, but their variations do not afford good generic characters, as they are generally sexual. Usually they are simple in the ♀ and more or less pectinate or ciliate in the ♂; sometimes they are both simple, and then again both sexes have them pectinated. In some of the lower forms the males have them bunched or knotted at or below the middle, sometimes there is a tuft of hair at this point, and sometimes alone, or in addition to either or both of these distinctions, there is a decided bend, usually above the middle. Sexual characters alone should not authorize genera, and therefore the variations of the antennæ should not have a generic value.

The *clothing* of the head varies with the clothing of the entire insect, but it is sometimes modified into tufts. There is occasionally a small tuft at the base of the antennæ, and often one in front, between the palpi. Sometimes the clothing of the front is smooth and even; then again it is rough, divergent, occasionally mixed with bristles. None of these modifications alone have a generic value, but they add to the value of others, and combined with them, may attain a greater value.

The *size* of the head as a whole, varies somewhat in the sexes, and does not alone afford good generic characters, but combined with the

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mode of its attachment to the thorax, it attains a higher value. The head is sometimes free, separated from the thorax by a distinct constriction, and sometimes it is closely applied to it and almost buried in its vestiture. This about exhausts the head, and it will be seen that by the variations of the head and its appendages alone, numerous divisions and subdivisions can be established, which will simplify the determination of unknown species.

The *thorax* and its appendages vary less, but even here there is a great deal of difference.

In *shape* it is usually convex, sometimes very large and heavy, rarely small; often it is somewhat depressed and occasionally quite flat; sometimes it is quadrate, but more usually rounded or ovate. Alone these variations do not present good generic characters, but combined with tuftings and the proportion the thorax as a whole bears to other parts, they afford good distinguishing features.

The *vestiture* is usually hairy, often scaly, and sometimes a mixture of both. The extremes would be generically distinct, but where the vestiture is mixed, the question is not free from doubt; ordinarily an insect with mixed vestiture would be distinct from either a hairy or a scaly one, but sometimes the mixture is so slight, or the hairy insect has the hair so much flattened, that a generic separation would be unjustifiable. *Acronycta* and *Hadena* each fall into two very well marked divisions by the character of the vestiture.

The *tuftings* vary considerably. Sometimes there are none, sometimes there is only a small acute tuft behind the collar, sometimes a divided crest or tuft in the same place, and again there may be a rounded or truncate bunch of hair. Posteriorly there is usually a larger rounded tuft, but sometimes, as in *Plusia*, it rises upward saddle-shaped, or as in *Zale* and *Homoptera*, it is divided into three diverging tufts truncate behind.

The *collar* is sometimes produced at the middle, and excavated at either side, sometimes flat, disk-like, or again, as in *Cucullia*, hood-like and exaggerated.

These modifications of tufting and collar have but a small generic value. The presence or absence of either, or the variations in form, would not indicate a generic difference, though a total absence o tufts would probably do so if there were no intermediate forms.

The *tibia* are sometimes spinose and sometimes not. This affords an

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absolute generic distinction. Sometimes all the tibia are spinulated, sometimes middle and hind tibia only, and sometimes only the middle tibia; the number of tibia spinulated has no generic value. The posterior tibia has usually (if not, as I believe, always) two pairs of spurs, one pair near the middle and the other at the tip. The middle tibia have a single pair at the tip.

The anterior tibia varies greatly in shape and armature, and its modifications afford good generic characters. Usually it is proportionate, and unarmed at tip; sometimes it has spinules at the extremity, and sometimes a single strong claw; sometimes the spines and claw co-exist. Neither of these alone authorize generic distinction. Sometimes the tibia is very short, exceeded in length by the first tarsal joint and variously armed at the tip; this suffices for generic distinction irrespective of the armature. This latter is various, sometimes consisting of spines and sometimes of claws at the tip. Very often the tibia, besides being shortened, is also flattened and becomes broader anteriorly; this also authorizes separation from a genus with the fore tibia equal, no matter what its length. In a few genera the anterior tibia is almost fossorial; *Tricopis*, for instance, having a very heavy, long inner claw, and three shorter but equally heavy claws outwardly. *Tamila* has very heavily armed tibia, and in *Heliolonche* the inner claw is nearly as long as the tibia itself, and not much more slender than the tarsi. The variations in the number of claws or their length alone, do not authorize generic separation, but added to a change in the form or proportion of the tibia, they would.

The males sometimes have a brush of long hair at the inner side of the anterior tibia, but this has no generic value.

The femora vary little, and so far as I know, not at all in the American forms; in the European forms two genera have them clavate. Such a modification would support a genus.

The tarsi, so far as I know, are always spinulated. They are sometimes distinguished by long fluffy hair on the anterior and middle pair (*Eriopus*), or by long, dense, vertical, upright hair on the posterior (*Remigia*). These modifications being sexual purely, have no generic value.

The *wings* vary greatly in form and proportion. Usually the primaries are elongate, widening gradually outwardly, with rectangular or obtuse apex, slightly oblique outer margin, rounded hind angle and straight inner

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margin. The secondaries are usually more or less rounded, shorter and broader than the primaries.

This is their form in the typical *Noctua*, but variations from it are numerous ; sometimes the wings are short and broad, again they are narrow and equal, sometimes lanceolate, and occasionally falcate. In one species only the primaries are divided to the middle, and this is the lowest of our Noctuids, if indeed it belongs to the group. Some genera have a tooth at the hind angle of primaries, some a slight projecting lappet, and others have this angle either rounded or excavated. Little generic value can be given to these variations, as in *Plusia* all forms of wings can be found. A lanceolate primary would however indicate a distinct genus, and the same can be said of a decidedly angulated or falcate one. A broad lappet at the middle of the hind margin would indicate a distinct genus, but a merely sinuate hind margin would not. The proportion that the wings bear to each other and to the body, have a high generic value, and genera can be safely rested on that point ; be it understood, however, that I do not mean by this that every difference in that respect authorizes a genus. The proportion must be one striking the eye at first sight, and not to be only discoverable by careful measurement.

The *venation* of the wings among the *Noctuids* varies very slightly, and the variations have been very generally considered as having an absolute generic value.

The *abdomen* varies somewhat in shape and proportion, and also in the tuftings. As to shape, it is usually more or less cylindrical, generally reaching to and often exceeding the hind angle of the secondaries ; sometimes it is cylindro-conic, as in most *Catocala*, and sometimes it is flattened, as in *Scopelosoma* and some species of *Orrhodia (Glaea)*. Its variations of form do not afford good generic characters, nor does its length, unless the proportion is exaggerated.

The *genitaliæ* of the males vary somewhat, but these variations, while affording excellent specific characteristics, have no generic value. First, because they are sexual merely ; second, because there is an insensible gradation from one into the other, rendering separation impracticable ; and third, because occasionally insects otherwise very closely related, differ very widely in this particular.

As to tuftings, these vary little in shape, being usually round bunches of vertical hair or scales, varying in number and size. Their presence or absence has no generic value, but affords good specific characters.

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The foregoing includes most of the structural peculiarities of the group *Noctuidæ*, and it will be seen that there is nothing whatever in them that a student moderately familiar with the names of the parts of an insect, can not himself examine with but little trouble, and nothing requiring any higher magnifying power than that afforded by a good Stanhope lens.

PSEPHENUS LECONTEI.

BY J. GEO. GEHRING, CLEVELAND, O.

A few notes as to the habits and whereabouts of this inhabitant of the rapids of Niagara may perhaps be of interest to such collectors as may visit this locality the coming season. This interesting beetle being but rarely represented in collections, I felt induced to make extra exertions during a few hours sojourn there last August, to find it, and was finally rewarded by finding it in numbers. Although my time did not allow me to reap the benefit of my discovery, still if others are enabled to profit by these notes, the result will be the same.

By turning over the small rocks which lie in the small rapids close by the Goat and Sister Islands, the flat, crustacean-like larvæ will be found in great numbers adhering tightly to the under surface in all stages of development, and it is here one would naturally look for the perfect insect, but only to be disappointed. I spent nearly all of my time in this fruitless search, finding only *one* specimen on the under side of one of the stones, which proved to be a gravid female, and had well nigh given up in despair, when the sudden appearance and immediate disappearance of several small, shining beetles on the wet surface of a partly projecting stone aroused my attention. Every alternate wave would submerge the stone, when the objects of my anxiety would take flight, only to alight the next moment when the water retreated. After a deal of maneuvering, I succeeded in getting one, but to find that in my anxiety to get it I had crushed it hopelessly, but not so much as to prevent me from recognizing *Psephenus Lecontei*. The truth now dawned upon me that the place to look for Psephenus was not *under* but *outside* of the water, and accordingly I closely scanned the neighboring projecting stones. I soon found

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the objects of my search to be perfectly at home on these projecting rocks, which were momentarily submerged by the waves, taking seemingly special delight in frequenting rocks where the current was most rapid and the swirl of the waters the strongest. It is a very active insect, and considerable dexterity is needed to take it without mutilating, the moment it alights on the slippery stones.

It would seem that it leads its matured existence entirely on the outside of the water and in the sunlight, the female only entering it for the purpose of depositing her eggs on the under side of the stones.

I am confident that any collector will be well rewarded for his trouble if he will follow the above suggestions in looking for Psephenus.

LARVA AND PUPA OF PHEOSIA RIMOSA, PACK.

BY CHAS. F. GOODHUE, WEBSTER, N. H.

Mature larva, 1.50 to 1.75 long. The body increases in size from the head to the anal segment, deeply incised between the segments. Head small and nearly round; first four segments can be retracted nearly one-half. Head and entire upper parts of body pale slate color, slightly shaded with brown on the dorsal portion. Yellow beneath between the legs, also a slight stigmatal line of the same color. Caudal horn short and black; the black extends from the base of horn to below the stigmatae. Anal shield rusty and rough; stigmatae black, encircled with yellow; abdominal feet black, the rest pale yellowish. Another specimen differs in color, being pale lavender, a slightly darker dorsal line. Under parts between the legs, a faint substigmatal line greenish yellow. Another, slightly smaller, was of a bright pea green color, with a bright yellow stigmatal stripe, in other respects like the former. The larvae are very much like those of the Sphingidae in appearance, and are exceedingly smooth and shiny. Found on willows and poplars, the last of Sept. The transformation takes place in a slight cocoon of dead leaves fastened together with a few silken threads, on the surface of the ground, much in the manner of *Darapsa myron*.

Pupa dark brown. Head case smooth, deeply incised between the abdominal segments. Anal segment large and smooth, ending in two

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short points. The moth appears early in spring and is probably double brooded, as Mr. Fred. Tepper, in the Bulletin of the Brooklyn Ent. Soc., Vol. II., page 4, speaks of the moth in August.

ON CERTAIN FORMS OF NORTH AMERICAN NOCTUIDÆ, INTERESTING FROM THE STRUCTURE OF THE CLYPEUS AND TIBIÆ.

BY A. R. GROTE.

The following genera seem to fall in between *Heliothis* and *Plusia*. They appear to be distinctively American, and there is nothing like them in the European or Asiatic faunæ, so far as appears in literature. The white species inhabit the West and South-west; and the fore wings are remarkable for their lustre, the markings consisting often of black dots, in this recalling *Emydia* and certain Lithosians.

BESSULA Grote.

Vestiture hairy. Eyes naked. Front full, without excavation or tubercle, the infra-clypeal plate prominent. Tibiæ spinose, the fore tibiæ with a claw. Thorax untufted. Antennæ simple. Fore wings dull. Aspect of the Arctiid genus *Pareuchaetes*. One species from New Mexico, *Luxa*, Grote. Primaries very light and fady yellow. The t. p. line indicated by a curved series of faint ochrey dots. Two cellular dots and one or two more in place of t. a. line. Beneath costa and apices dusky yellowish. The coloring is very pale and the dotted markings tend to become lost. Consult: Papilio, I., 176.

ANTAPLAGA Grote.

Vestiture scaly. Eyes naked. Fore tibiæ with a stout claw. Front with a protuberance rising from the lower margin of a rim-like excavation jutting out from above the infra-clypeal plate. Primaries white, silky, shaded outwardly transversely with olivaceous fuscous, the dark ground color cut by the whitish subterminal line. In shape the fore wings widen outwardly, the apices are produced and the costal margin is long; the external margin very oblique and the internal margin comparatively short. One species from Colorado, *Dimidiata* Grote, Can. Ent., 9, 71.

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PIPPONA Harvey.

Vestiture scaly. Eyes naked. Labial palpi short. Front full without excavation or tubercle. Thorax untufted. Cut of the wings somewhat like *Heliophila*. Fore wings satiny white, immaculate. Antennæ simple. All the tibiæ spinose; fore tibiæ strongly armed. One species, *Bimatris* Harvey, from Texas, with yellowish head and abdomen; primaries with a faint yellowish costal tinge; shaded beneath with fuscous. There are probably no "claws" to the front tibiæ, only stout spines. Consult: Bull. B. S. N. S. III., 9.

EPINYCTIS Grote.

Vestiture scaly. Eyes naked. Labial palpi short. Front full, without excavation or tubercle; the infra-clypeal plate prominent. Tibiæ non-spinose; fore tibiæ short, with a claw. Thorax and abdomen untufted. Antennæ simple. Cut of the wings somewhat like *Cucullia*. Primaries narrow and long, apices pointed; external margin oblique, even; the wings satiny white. One species, *Notatella* n. s., size of *Bimatris*, from Montana. Fore wings with two black dots on the cell. Below, on internal margin, about where the median lines might terminate, are two more. A row of black points along external margin. Else concolorous, immaculate white.

PLAGIOMIMICUS Grote.

Vestiture scaly. Eyes naked. Front with a cup-like excavation, the raised edges forming inferiorly a corneous projection above the infra-clypeal plate. Tibiæ unarmed; fore tibiæ with a claw. The tegulæ spreading away from the thorax behind with elevated terminal scales. Body untufted. One species, from New York to Texas, fuscous, with angulated pale lines and a dark sub-apical, costal triangulate patch, *Pityochromus*, Grote, Bull. B. S. N. S., I., 182.

POLENTA Morrison.

No characters are given by the author of this genus, excepting the negative one that it may be distinguished from *Schinia* by the "plain" fore tibiæ. I have shown, Bull. B. S. N. S., III., that the genus is not allied to *Schinia*, of which *trifascia* is the type; it differs throughout from that genus. It differs by having a frontal excavation, and it agrees with *Plagiomimicus* in this respect, as well as in the peculiar tegulæ and

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especially in the pattern of ornamentation. *Polenta Tepperi* is a very pretty, delicate, dusky greenish species from the South, and its sole generic distinction from *Plagiomimicus*, the "plain" fore tibiae, wanting the claw, must be verified. The frontal excavation is slighter and its shape a little modified as compared with *Pityochromus*, but in their peculiar appearance the two insects are so similar that they would hardly be referred to different genera. It must be remembered that Mr. Morrison redescribes *Pityochromus* as *Schinia media*, and that it is with this species, which has a claw on the fore tibiae, that Mr. Morrison compares *Polenta*. The typical species of *Schinia*, *trifascia* and *rectifascia*, appear to me to have the fore tibiae unarmed.

STIRIA Grote.

Vestiture scaly. A moderate frontal excavation with a moderate tubercle near its inferior edge. Eyes naked. Legs unarmed, the fore tibiae with a stout blunt claw. The thorax is short with the extremity of the patagiae spreading and fringed with uplifted scales like *Plagiomimicus* and *Polenta*. Size large; fore wings broad with a Plusia-like tooth at internal angle. The species is rather light bright yellow, with frosted purple patches at base on internal margin and at the centre of the wing, while the terminal space and thorax are also of this darker shade. A showy species, *Rugifrons*, Grote, Bull. B. S. N. S., II., 73, from Illinois, Kansas and Colorado.

STIBADIUM Grote.

A curious moth, resembling the fuscous species of *Gortyna* in color (*necopina*, *nitela*), but slighter. The wings have not the fringed tooth at internal angle of primaries as in *Stiria*, but belonging here from the shallow excavation of the front, wanting, however, the tubercle, and the unarmed tibiae, the fore tibiae with a claw. The peculiar frosted coloring also allies the moth to *Stiria*. *Spumosum* Grote, Bull. B. S. N. S., II., 74, occurs in the same localities with *Rugifrons* and in two varieties, one paler, more ochrey than the typical form.

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NEW OR LITTLE KNOWN GENERA OF NORTH AMERICAN SYRPHIDÆ.

BY DR. S. W. WILLISTON, NEW HAVEN, CONN.

In the preparation of a synopsis of the North American genera of Syrphidæ, I have found several new species that could not be placed in any of our known genera. A careful study of the figures and descriptions of exotic forms has not thrown much light upon them, and I am therefore constrained to regard them as new.

With the genera included in the present paper, and resuscitating Macquart's *Toxomerus*, the number now recorded from North America will reach sixty, all but five or six of which are in the writer's collection. Of these, but nine or ten have not yet been found east of the Central Plains, and the following, only, that are not now known west of that region, viz., *Triglyphus*, *Senogaster*, *Pyrophaena*, *Doros*, *Ocyptamus*, *Rhingia*, *Brachypalpus*, *Somula*, *Temnostoma*, *Merapioidus*, *Pterallastis*, *Teuchocnemis* and *Lepidomyia*, leaving nearly forty genera that occur entirely across the continent; indeed a large proportion of the species are identical from the Atlantic and Pacific regions.

Merapioidus villosus Bigot, Bul. Soc. Ent. France, 1879, No. 6, p. 64. An aberrant and well marked genus, easily recognized by the peculiar structure of the antennæ, the third joint of which is extended on its upper anterior part into an elongate cone, slightly bent forward and terminating in the thickened arista. The arista is really subterminal, showing the development of such genera as *Callicera* and *Ceria*. Body short, oval, abdomen with interrupted metallic fasciae. Its relationship is remote from *Milesia* in Schiner's acceptation (*Sphixea* Rond., Bigot.) viz., with the closed sub-marginal cell. It may be placed in the neighborhood of *Criorhina*, *Chrysochlamys*, or the following:

Brachymyia gen. nov. Head short, broad, antennal prominence well developed in the male, conic, less so in the female. First joint of antennae longer than the second, third broader than long, transversely oval. Face much produced downward and forward, conical, pointed, tuberculate, cheeks broad. Front short, eyes bare, separated in the male by the tumid ocelligerous tubercle. Body with long pile, abdomen short, broad, arched, without markings. Legs all slender, simple. Third longitudinal vein nearly straight; small cross vein very oblique, near outer third of discal cell.

Brachymyia lupina, sp. nov., ♂ ♀. Face on the sides covered with

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yellowish gray pollen, with the broad median stripe and cheeks broadly shining black. Antennæ brownish black, first joint twice as long as second; third joint somewhat reddish or brownish black. Front in the female shining black, covered with reddish or fulvous pile or hair, on the sides below pollinose. Frontal triangle in the male pollinose as on the face, the tumid ocelligerous callosity black, opaque, slightly pollinose and with a tuft of long reddish pile. Proboscis in female as long as the thorax, shorter in male. Posterior orbits below tumid, thickly pollinose and with a conspicuous fringe of yellowish white pile. Thorax black, shining, with metallic lustre and reddish or fulvous pile, longer and thicker on the scutellum. Abdomen shining black, with sparse similarly colored pile, the hind borders of the segments narrowly pollinose. Legs black, extreme tips of femora, basal third of tibiae, and basal joints of tarsi, especially the middle pair, a brownish yellow or luteous. Wings hyaline, a faint blackish shade near the tip; near the origin of third vein a narrow indistinct brownish cross band, small cross vein also narrowly clouded; first posterior cell closed in the border of the wing. L. c. 10–13 mm.; l. al. 7½–11 mm. Four specimens. California.

Brachymyia (*? Eriophora* Ph.) *nigripes* sp. nov., ♀. Sides of face covered with yellowish pollen, broad median stripe and cheeks shining black; front black with black pile. Antennae black, first joint but a little longer than the second. Proboscis long. Posterior orbits fringed with whitish pile below. Thorax black, with fulvous pile in front, across the middle with black, the pleurae, scutellum, and especially the posterior angles, with lighter, yellow, and more bushy pile or hair. Abdomen black, shining; short, broad, and arched; the sides of the second, and all the fourth and fifth segments with thick yellow pile; elsewhere the pile is shorter and black. Legs wholly black. Wings hyaline, a little shaded near the tip, small cross vein faintly clouded, first posterior cell closed before the border of the wing, petiolate. L. c. 14 mm.; l. al. 13 mm. Five specimens. California.

The greater, more woolly pilosity, and the conically produced face leave me in doubt as to its relationship to *Eriophora* Ph. (Ver. zool. bot. Gesell. in Wien. 1865, p. 735, pl. xxvi., fig. 36).

A third species from Maine, rather larger than the last, differs in the two basal segments only of the abdomen being yellow pilose, and the tibiæ and tarsi mostly a deep red.

Hadromyia gen. nov. Antennae situated below the middle of the

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head, the antennal protuberance of moderate size. Antennae short, third joint obliquely oval, front (♀) rather narrow, somewhat arched, sides nearly parallel. Face deeply concave from antennae to tip, short, without tubercle, arched. Cheek very narrow, descending but a very short distance below the eye. Oval opening large, broad; proboscis short. Posterior orbit not tumid. All the femora very slightly thickened, simple, without spines, or protuberance. Abdomen uniformly black, broad, oval, arched. Sub-marginal cell open. Third longitudinal vein nearly straight, small cross vein quite oblique, beyond the middle of discal cell.

Allied to *Brachypalpus*, but differs in the simple unarmed femora, and the broad, short body.

Hadromyia grandis, sp. nov., ♀. Brassy black, shining. Front black, covered with gray pollen, and (except below) with short yellow pile, slightly intermixed with black at the vertex. Antennæ reddish brown, blackish toward the base. Face a dull whitish yellow, cheeks black, shining. Dorsum of thorax from in front of the wings and pleurae thickly covered with short yellow pile. Posterior half of thorax, scutellum, and first three segments of abdomen with thick, short, black pile; fourth and fifth segments of abdomen with longer yellow pile, abdomen scarcely longer than thorax. Legs black with short black pile; knees slightly reddish, anterior tibiae in front, the tips of posterior tibiae behind and anterior and posterior tarsi, with short thick golden pile; middle tarsi reddish. Wings hyaline; costal cell and stigma yellow; posterior cell petiolate. L. c. 23 mm. L. al. 17 mm. Width of head and thorax 6 mm.; of second segment of abdomen 8½ mm. One specimen. Washington Territory (H. K. Morrison).

? Brachypalpus pulcher, sp. nov., ♂ ♀. Face yellow with black cheeks, and with or without blackish or brown narrow median stripe; frontal triangle of the male yellow or fuscous; front in the female black, rather narrow, a little broader below, yellow pollinose on the sides, pile short, fuscous. Eyes of male with enlarged facets above. Antennae yellowish brown or black, first two joints short, third obliquely oval, of a lighter color near the base below. Dorsum of thorax and scutellum black, with a bluish or partly metallic reflection, or in better preserved specimens a metallic bronze, the pile of dorsum more fulvous, on postalar callosities, scutellum and pleurae, yellow. Abdomen of a brilliant golden or bluish bronze, with short golden pile and opaque black markings as follows: first segment except the sides, second segment on the anterior

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part, and a band beyond the middle of about the same width, somewhat angulated in front, third segment similar, except the anterior border may be quite narrow and the cross band sub-interrupted, fourth segment in male wholly bronze, concealing the hypopygium, in female with very narrow front border and narrow interrupted cross band; the black is attenuated on the sides, not quite reaching the lateral margins. Legs yellow, femora rather stout, anterior and middle pairs mostly brownish or black, sometimes prevailing yellow blackish above, posterior femora varying from a blackish ring near the base, to almost wholly black, below with short black bristly hairs near this end; three last joints of tarsi black. Wings smoky hyaline, stigma yellowish brown, small cross vein near outer third of discal cell. Long c. 12–16 mm., 10 specimens. Mt. Hood, Oregon; Washington Territory (H. K. Morrison).

The fasciate abdomen of this species differs from all known *Brachypalpi;* the spines below the hind femora are also quite small. Its pilosity will hardly allow it to be placed with *Xylota;* besides, the face is not so receding as in that genus. The structure of the head is very much like the preceding genus. Its resemblance to *Sterphus* Ph. (l. c.) from Chili, is quite as great.

Eugeniamyia gen. nov. Allied to *Brachyopa*, but differs in the face being tuberculate, not carinate, rather more produced and less truncate, and in the abdomen being long as in *Xylota*. There are also well developed scutellar, postalar, dorsopleural and mesopleural bristles.*

Eugeniamyia rufa, sp. nov., ♂. Red. Head and antennae yellowish red, first two joints of antennae very short, third joint sub-quadrate, arista plumose. Dorsum of thorax darker, almost brownish red, with very short black hairs, and with two rather broad pollinose stripes, abbreviated behind, and enclosing in front a black spot not reaching the suture. Pleurae with sparse yellowish white pile. Abdomen narrower than the thorax and much longer, nearly bare, shining, somewhat blackish towards the end. Legs red, basal joints of tarsi yellowish, terminal joints blackish, femora considerably swollen, with tufts of yellowish white pile below near the base, the middle and more especially the posterior pairs and posterior tibiae with sparse short bristle-like spines. Wings clouded with brownish on the anterior part, sub-hyaline behind. L. c. 14 mm.; l. a. 10 mm. One specimen, Washington Territory (H. K. Morrison).

* See Osten Sacken: "An Essay of Comparative Chaetotaxy," Mitth. d. Münchener Ent. Ver., 1881.

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ENTOMOLOGY FOR BEGINNERS.

"*LONG-STINGS.*"

BY W. HAGUE HARRINGTON, OTTAWA, ONT.

Among the conspicuous insects which attract the attention of even non-entomologists, there are few more interesting in their structure and habits, as well as in their relations to other groups, than the large "long-sting" ichneumons with their long triple "tails." Our two largest species belong to the genus Rhyssa (of the Hymenoptera), and as, so far as I am aware, no accounts of them have yet been published in the ENTOMOLOGIST, a brief description of their appearance and habits may not be undesirable.

They may be easily distinguished from their relatives (often their victims), the "horn-tails"—Uroceridæ—as they are much more slender in body and appendages. The female, readily determined by the extraordinary development of the ovipositor, has the abdomen stouter than that of the male, with the posterior segments dilated and curved under, and bearing the ovipositor, which is constructed essentially of the same parts as is that of a "horn-tail," only that they are greatly lengthened.

The head, in shape like a short segment of a cylinder, slightly convex before and concave behind, bears on its rounded front a pair of large eyes, from between which spring the long slender antennæ. The head is joined by a small neck to the thorax, which is strongly built and supports two pairs of long narrow wings, as well as the six very long and slim, yet strong, legs. The segment of the abdomen which adjoins the thorax is much less in diameter than the succeeding ones.

The male has a long cylindrical abdomen tapering gradually to the extremity. This, in connection with the prominent head and narrow wings, gives him, especially when in flight, a considerable resemblance to a dragon-fly, from which, however, he is at once distinguished by his long antennæ and shorter hinder wings.

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In these insects, as in the Uroceridæ, the hinder-wing has upon its anterior margin a row of minute hooks with which to hold the posterior border of the front one. The number of the hooks is, however, much less, there being only about a dozen scattered along the outer half of the wing.

Of our two species the larger and handsomer is *R. atrata*, of which my specimens vary in length from a little over one and one-quarter inches to nearly two. The head is a rich yellow, with the exception of the eyes and a slight band, bearing the ocelli, on the vertex. The slender antennæ, about an inch long, are also yellow, as, likewise, are the extremely long legs, with the exception of the upper joints of the posterior pairs. The thorax and abdomen are black. The wings, which expand from two to two and three-quarter inches, are transparent, but with a dark smoky tinge. The female is furnished with an ovipositor from *four to five and one-half inches in length;* flattened and scarcely stouter than a hair.

R. lunator is more common, at least in this vicinity, and varies much more in size, the largest specimens being fully twice as big as the lesser ones. The body varies in length from three-quarters of an inch to one and one-half inches, and bears at its posterior extremity an ovipositor projecting from one and one-half to three and three-quarter inches.

The head is yellow with a dark band, in which are inserted the three ocelli, between the eyes, parallel to which runs another dark line which almost encircles the head. Lines also run from the base of the antennæ to the mandibles. The slender antennæ are dark at the base but get lighter toward the tip. The thorax and abdomen are dark brown, ornamented with lines and borders of yellow, which is also the color of the legs. The wings (front pair) expand from one and one-quarter to two and one-half inches, and have a quadrangular dark patch on the anterior border.

The larvæ of both "long-stings" feed upon those of the Uroceridæ and other wood-borers, in which the female ichneumon deposits her eggs by means of the long ovipositor. The method of performing this operation may often be witnessed during the summer by visiting beech trees in which Tremex larvae are at work, but it is difficult to describe clearly its accomplishment and the different postures of the insect during the progress of her laborious and dangerous duty. A series of good drawings would best convey a correct idea of the process, but I do not know of any book in which such are to be found, while some illustrations are very inaccurate. For instance, I saw the other day in a text book of zoology

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an ichneumon depicted with her ovipositor fully inserted in the tree and with the *side-pieces or sheaths sticking straight out behind her*. Such an attitude is altogether unnatural, and I am convinced that in that position she would be powerless to extract the ovipositor.

Selecting a suitable tree, if we find no ichneumons at work, we may shortly see one flying strongly and noisily through the sunny woods and settling upon the bark where perforations mark the exits of previous occupants. Here she runs around until she finds a promising spot, as, for instance, the hole made by a Tremex in depositing her egg. Placing herself so that the tip of her abdomen will be above the orifice to be probed, she makes herself as tall as possible, and, by elevating her abdomen and curving under the ovipositor, succeeds in inserting the tip of the latter in the hole.

If the dorsal surface of the abdomen be examined, there will be observed, between the sixth and seventh segments, a gap closed by a whitish membrane. This marks an admirable contrivance to enable the insect to use her seemingly unwieldy weapon, for the membrane is capable of being so dilated as to form a cavity in the posterior part of the abdomen, in which can be coiled a large portion (more than one-third) of the ovipositor, which thus becomes perpendicular under the insect, where it is guided and supported by the sheaths which bend up in loops over her back. By vigorous muscular contractions of the sac, the delicate ovipositor is slowly forced down the larva's burrow, often to its full extent. If a larva be reached an egg is deposited in it, and the ovipositor is slowly withdrawn in a similar manner. This, however, the insect is frequently unable to accomplish, and remains struggling until some bird or tree-toad snaps her up, or she perishes from exhaustion.

I have seen a large *R. atrata* with her ovipositor (five and one-quarter inches long) inserted four and one-half inches into a beech, so firmly that it was only by careful and vigorous pulling that I extracted it uninjured.

The insects are to be found during the latter part of the summer; *R. lunator*, as already mentioned, being much the more abundant.

On the last day of June, 1879, while collecting in a grove just beyond Rideau Hall, I stopped to examine a dead tree for bark and fungi beetles, and was bottling a fine *Penthe pimelia*, when the rustling of insect wings above me attracted my attention. Looking up I saw several specimens of *lunator* flying about the trunk, and a circuit of the tree with closer inspection showed many others walking about on the bark or in various

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stages of the act of ovipositing. The tree was a large one, about two feet in diameter, from which the top had been broken off at a height of thirty or forty feet. The rugged bark was dotted all over with *lunators*, often massed in rows or patches, so that there must have been several hundred upon the tree, forming an unusual and most interesting spectacle. The great majority were females, but a number of males were also present. While I was consigning to my bottle a few specimens, a large woodpecker settled upon the opposite side of the tree and began to rapidly thin the ranks of the helpless insects, whose mission, like that of the woodpecker, is the destruction of wood-boring larvae.

A year later, being in the same locality, I visited this tree and found again a number of ichneumons engaged in the performance of their duty, and also saw sticking out of the bark many ovipositors which had belonged to unfortunate visitors of the previous summer.

DESCRIPTION OF THE PREPARATORY STAGES OF DEBIS PORTLANDIA, Fabr.

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg.—Obovoid, the base a little flattened, and under the middle thereof is a slight rounded protuberance of lesser diameter; surface smooth; color greenish-white. Duration of this stage 4 to 6 days.

Young Larva.—Length .13 inch; cylindrical; head twice as broad as any other segment, body tapering slightly from 2 to 13; each segment from 3 to 12 several times creased, making 6 flat ridges, of which the foremost one is broadest, and on this and the fifth ridge each is a minute tubercle and rather long white hair, bent forward, the whole series forming two subdorsal rows, one a little below the other, from 3 to 13; on the middle of side a similar row, one hair to each segment and placed on the second ridge, all of them bent forward; lower down a third series, one to each segment, placed on the fourth ridge, all bent down and back; two short hairs over each pro-leg; on segment 2 are four long hairs on each side, nearly in line, two being subdorsal, the others lateral; on 13 are four hairs in cross row, all curved back, and one on either side behind these; this segment is roundly excavated at extremity, making on either

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side a sharp point, which sends back a straight hair; color of body whitish-yellow, in a few hours changing to pale green; head sub-globose, flattened and depressed at top, broadest at base, a little broader than high, the vertices rounded, and on each a slight protuberance, with long curved hair; a similar hair a little below and nearer the suture, and two rows of shorter hairs across face, four in upper, six in lower row; surface corrugated; color yellow, somewhat brown-tinted. Two days later, as the body was changing to green, the head changed to yellow-green. Duration of this stage 6 to 8 days.

After 1st Moult.—Length .26 inch; cylindrical, tapering from 2 and ending in two long, slender, blunt-tipped tails; color of body bright green; much covered with whitish tubercles mostly arranged in longitudinal rows, one being on either side the medio-dorsal line, one sub-dorsal, one infra-stigmatal, and in the intervening spaces are many separated tubercles; each tubercle ends in a short, stiff white hair; under side, legs and pro-legs green; head obovoid, truncated, well rounded on front and sides, depressed at top, the vertices rather high, each bearing a tapering, roughly tuberculated process or horn, which is green with red tip; the face much covered with white, conical, separated tubercles, arranged in vertical rows; ocelli black; color of head green, rather darker than body. To next moult 7 to 8 days.

After 2nd Moult. Length .44 inch; shape as at second stage; color light green; the tubercles of the subdorsal line more prominent, more yellow, and run from horns to tails; another such row along basal ridge; head shaped as before, bright green, the horns long, tapering, green with red tips. To next moult 9 to 15 days, depending on the weather.

After 3rd Moult.—Length .52 inch; shape and color as at preceding stage. To next moult 6 days, in case of a single larva which died soon after the moult. All others have hibernated in stage following 3rd moult.

After 4th Moult, in Spring.—Length .6 inch; color yellow-green; in addition to the dark green medio-dorsal stripe is another sub-dorsal, and a second on mid-side, both narrow, scarcely more than lines. In 11 to 20 days the larvæ reached 5th moult.

After 5th Moult.—Length 1 inch, greatest breadth at segments 2 and 3, 13-100 inch, then tapering to extremity; color as before. In about ten days the larvæ reached maturity.

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MATURE LARVA.—Length ♂, 1.2 inch, greatest breadth (in middle segments) .16 inch; ♀ 1.4 in., gr. br. .17 inch; the dorsum much arched and sloping about equally either way from middle segments; ending in two small, short and slender tails; each segment several times creased, the front ridge so caused flattened and about twice as broad as any other, the others equal and rounded; covered with fine whitish tubercles, mostly disposed in longitudinal rows, each bearing a short stiff hair; color yellow-green; on middle of dorsum a dark green band; on the edge of dorsal area a yellow line to tail, and on upper side of this a dark green line; another such on middle of side; along base a narrow yellow stripe; tails pink-tipped; under side, feet and legs pale green; head obovoid, well rounded on front and sides, the vertices high, each bearing a stout tapering process or horn, tuberculated; color yellow-green, the upper part of horns red; the sides of face bear many rather large, white, conical and separated tubercles, disposed in oblique rows; ocelli brown; in one position the largest is green with a brown rim, at other angles it is brown. From 5th moult to pupation 15 to 16 days.

CHRYSALIS.—Length .6 in.; greatest breadth, across base of wings .22, across abdomen .22 inch; cylindrical, the abdomen conical, the wing cases considerably raised along dorsal side; the head case short bevelled transversely to a sharp edge, roundly excavated on the sides, the top rather broad, very little incurved, the corners sharp but not produced; mesonotum prominent, angular, the apex rounded, carinated, the sides flat and sloping; color delicate green, sometimes blue-green, the ventral side of abdomen lighter or whitish; the top of head case and edges of wing cases next dorsum cream color; surface smooth, glossy. Duration of this stage 13 to 14 days.

The chrysalis much resembles that of Satyrus *Alope;* the head case is broader, sharper-edged, the mesonotum more angular and more prominent, and the abdomen more protuberant on the dorsal side; the surface is also smooth, with no granulations.

The caterpillar also somewhat resembles that of Satyrus *Alope*, much more than it resembles any of our species of Neonympha, except that the head bears a pair of horns or processes, as do several of the Neonymphæ, whereas the head of *Alope* is round. The egg is quite unlike Satyrus, of which I have seen several species, all having been rather cylindrical, with vertical ribs. Whereas the egg of *Portlandia* is rounded and smooth, very much as Neon. *Canthus*, but more ovoidal.

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In Say's time, (about 1825), this insect was known only as Southern. He says: "It has not been found so far north as Pennsylvania." Gosse, in Canadian Naturalist, p. 246, 1840, mentions seeing an example in Canada. Mr. Scudder, 1863, includes it among the butterflies of New England, but says he has seen only a single specimen from N. E. I find in my notes that it has been taken at Orono, Maine (I think by Prof. Fernald), and on Mt. Holyoke, Mass., by Prof. H. W. Parker. At the West, Lieut. Carpenter has sent it to me from Fort Niobrara, Neb. Gosse, in his Letters from Alabama, p. 122, 1859, speaks of the butterfly (under name of Hipparchia *Andromacha)* as common in Alabama, and mentions its habit of frequenting the foot of a particular tree for many successive days, and sallying out on any passing butterfly, and after performing sundry circumvolutions, retiring to its chosen spot of observation again. He regards it as particularly "social and gamesome."

Portlandia is not a very common species in this part of West Virginia, probably because we have so little open forest at low elevation, the mountains rising abruptly from very narrow strips of bottom land. It is a forest species, not being found in the open fields so far as I have observed. Apparently it must swarm in certain localities in other States. Mr. Lewis Ullrich, of Tiffin, O., wrote me August, 1881, that ten days before he had taken about 150 good specimens, and rejected many not good, in a certain piece of woods near by, stating that they seemed to be confined to this particular spot, and so far as he knew were unknown elsewhere in that county. Mr. Ullrich, at my request, made another excursion, and succeeded in obtaining a female which he tied in a bag over grass, and so got a dozen eggs for me, 3rd Sept. From these I raised five larvæ to maturity. I have myself found great difficulty in obtaining eggs of *Portlandia* by this method, and have repeatedly failed. But twice succeeded, and carried a few larvæ over winter, only to lose all before chrysalis. Except in a single case, when the larva reached 4th moult 18th Sept., and presently died, all I have bred have gone into lethargy soon after 3rd moult. But the eggs have always been laid late in the season. Two moults are passed in the spring, but probably 4 moults are all which larvæ of the summer broods require. I have taken the butterfly, in different years, as early as 18th May, and through each month to 1st Sept., and I apprehend there are three annual generations here, the first in May, the second middle of July, the third late in August, as I have taken fresh examples at these times. Say describes the caterpillar briefly, thus:

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"The caterpillar is downy and bimucronate behind." And the chrysalis: "The pupa is suspended by the tail; it is angulated, bimucronate on the front." Mucronate means in his glossary "terminating in a sharp point." That will do for the caterpillar, as it is tailed, but the chrysalis is wrongly described, its head case being square, without sharp points, or processes. Bois. and Lec. give a very fair representation of the chrysalis after Abbot, but the caterpillar is badly done, the head and its processes being quite out of drawing. Boisduval's description is drawn from the figure, not from nature, and of course is wholly incorrect, and he remarks that the two points which surmount the head spring up in the form of ears (s'éléveut en forme d' oreilles), as indeed they do, funnily enough, in the cut. The face is as that of a grasshopper, and the "ears" are as of a kangaroo, and the whole thing foreshadows a "gamesome and frolicsome" butterfly.

ON THE APHIDIDÆ OF FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

BY WM. H. ASHMEAD, JACKSONVILLE, FLA.

(Paper No. 3.)

Section SIPHONOPHORINI.
Genus SIPHONOPHORA, Koch.

The species of this genus already described from North America are as follows:

1. *S. rudbeckiæ*, Fitch.
2. " *ambrosiæ*, Thomas.
3. " *rosæ*, Reaum. A variety of this species I find here on cultivated roses and on the wild Cherokee rose. It differs very considerably from Prof. Thomas' description, and may be known as *S. floridæ*.

I submit following description:

S. rosæ, var. *floridæ*, n. s.

Wingless female.—Length .07 inch. Elongate ovate; pale shining green; eyes red; beak very pale and short, not reaching to middle coxæ,

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widening before tip, tip black; antennæ 7-jointed, reaching to base of honey-tubes, annulated with brownish-red at joints; honey-tubes long, reaching beyond tip of abdomen, pale greenish, very slightly infuscated at tip; style short, conical, pale green; legs uniform pale green, feet very slightly infuscated.

Winged individual.—Length .06 inch. Elongate ovate and shining green. Vertex of head reddish; eyes brown; antennæ reaching beyond tip of abdomen, dark brownish black, excepting basal joints, which are pale; thorax shaded with brown; abdomen pale; legs pale greenish yellow, knees black; wings hyaline, veins greenish yellow, discoidal vein black.

4. *S. avenæ*, Fab.

5. " *viticola*, Thomas. First detected here early in March on wild grape vines growing in our swamps; later it becomes quite common on cultivated vines.

6. *S. setariæ*, Thos.

7. " *euphorbiæ*, Thos.

8. " *euphorbicola*, Thos.

9. " *asclepiadis*, Fitch. Very common here in early spring on *Asclepias cornuti.*

10. *S. erigeronensis*, Thos.

11. " *cereopsis*, Thos.

12. " *lactucæ*, Linn. Occasionally found here on lettuce.

13. " *polygoni*, Walker.

14. " *salicicola*, Thos.

15. " *verbenæ*, Thos.

16. " *rubi*, Kalt. Rarely found in early spring on under surface of leaves of *R. villosus.*

17. *S. pisi*, Kalt.

18. " *gerardiæ*, Thos.

19. " *heucheræ*, Thos.

20. " *cucurbitæ*, Thos.

21. " *tanaceti*, Linn.

22. " *fragariæ*, Koch. Var. *immaculata*, Riley.

23. " *menthæ*, Buckton.

24. " *absinthii*, Linn.

25. " *achyrantes*, Monell.

26. " *calendulla*, Monell.

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27. *S. tulipæ*, Monell.
28. " *crataegi*, Monell.
29. " *sonchi*, Linn. Syn. *sonchella*, Monell.
30. " *calendulæ*, Monell.
31. " *tiliæ*, Monell.
32. " *liriodendri*, Monell.
33. " *prunicola*, Ashmead, Pacific Rural Press, 1881.
33. " *citrifolii*, Ashmead, Orange Insects. p. 65, 1880.

DIMORPHISM AMONG THE SIPHONOPHORA.

For many years dimorphism, viviparousness and parthenogenesis among insects have attracted universal attention. Not only from the fact of the rarity of their occurrence, when we take into consideration the countless insect hosts of varied forms, sizes and colors that constitute what may be termed the insect world; but to the biologist, the naturalist and the philosopher, they are of the most profound and absorbing interest as bearing upon some of the great unsolved questions of the day. A careful study of the economy of any one of the billions of animated forms that exist around us, will certainly unfold some hidden truth, give a glimpse, or reveal some knowledge of that mysterious, omnipotent and almost unknowable force pervading the universe. And will not facts derived from these studies enable mind—the supreme, the attainable—to grasp truths unattainable without them? Since Darwin's wonderful revelations in regard to earthworms, I have had the profoundest respect for them; and as I pass on my way to my business in the early morning and turn up with my foot their dwellings, disclosing their tortuous night work, I feel like bowing to them and saying: Oh, wonderful earthworm! You, too, are worthy of respect and admiration; for hast thou not during countless cycles of ages been helping to build up and beautify the universe and render it a fit habitation for man!

The subject under consideration has had the closest attention from some of the more thoughtful students of Entomology in this country, as well as in Europe. America may well feel proud of her investigators in this particular field of research, among whom may be mentioned Benj. D. Walsh, discoverer of dimorphism among the Cynipidæ; H. F. Bassett, who so ably continues the studies and adds to the discoveries respecting the habits of this family, since Walsh's death. We younger Entomologists may well imitate the example of W. H. Edwards, whose very thorough

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and able investigations and experiments with the diurnal Lepidoptera have thrown such a flood of light on dimorphism and what really constitutes "a species;" and last, but not least, Prof. C. V. Riley's similar discoveries among the Phylloxeræ and Pemphiginæ. All have done much towards elucidating the vexed question.

Among the Aphididæ proper, although it has often been suspected in America, no recorded instance of dimorphism among them, that I am aware, exists. The discovery of its occurrence in the Orange Aphis, *Siphonophora citrifolii*, described by me in my pamphlet on "Orange Insects," in the fall of 1880, therefore is of great interest, and no doubt will prove such to many readers of the CAN. ENTOM.

From observations made this year I find that from an egg laid by a fall oviparous female hatch the brown-black and black winged male and winged viviparous female, which I describe as follows:

Young.—Length .02 inch. Dark greenish brown, with dark eyes and glassy white antennæ and legs.

♂.—Length .04 inch. Color brown and brown-black; antennæ brown, legs pale or yellowish, posterior femora slightly shaded above with brown or black; feet reddish; nectaries shorter than in female; wings hyaline, stigmal spot pale.

These are rare among the first broods, and afterwards almost or entirely disappear.

♀ Apterous.—Length .05 to .06 inch. Broadly ovate. Dark brownish black. Head between antennæ reddish; antennæ 7-jointed, pale yellowish, apical ends of joints 3, 4 and 5 brown, 6th shortest, 7th long, setaceous; legs pale yellow, latter two-thirds of femora brownish or blackish, tips of tibiæ and claws brown; nectaries slightly thickest at base, black and cylindrical; cauda distinct.

♀. Winged viviparous. Length .06 inch. Color black and shining; eyes red-brown, tubercles of antennæ black, vertex of head reddish; rostrum reaching back of middle coxæ; antennæ not quite reaching to tip of abdomen; abdomen variable, brown-black, brown or olive-green; nectaries long, cylindrical and black; cauda long and recurved, dark; wings hyaline, stigma rather broad, brown, obliquely sharpening to a point at outer edge towards apex; stigmal vein strongly curved, three oblique veins, the third forked; hind wings with two oblique veins, in some specimens but one.

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I have watched these viviparous females breed on my orange trees, and the rapidity with which this is done is simply astonishing. In a few days broods upon broods, or young colonies, seem to exist on all the tender new leaves and shoots, and still the parthenogenetic young keep coming. Verily, if it were not for the chalcid flies, ichneumons and other parasites, they would be the death of the trees. By the middle of March a change takes place in the broods. The young differ from their parents in shape, color and size! So different are they as to discredit belief, and had I not watched them breeding day by day on my orange trees, I should have felt justified in describing them as a distinct species. They are undoubtedly a dimorphic form, and I give below a description:

Dimorphic, viviparous, apterous female.—Length .08 to .09 inch. Elongate; color a uniform pale pea-green, with more or less of a longitudinal shading of a darker green on dorsum, with the surface more or less corrugated; eyes bright red, with a prominent facet or ocellus springing out from hinder edge of same, giving it a toothed like appearance; antennæ 7-jointed, pale glassy green, in mature specimens the tip from 5th joint is reddish; legs of the same uniform pale green, with only feet red; abdomen at tip somewhat pointed; nectaries very long and thin, slightly curved, slightly swollen in middle, and pale green; cauda small, conical. Beak does not quite reach to tip of middle coxæ.

The winged form agrees in every respect with above description, and can only be distinguished by having wings, the veins of which are very pale. These are rare, the majority being wingless.

The mature viviparous female continues breeding and can often be found surrounded by from 20 to 30 pale green young; occasionally a brown one will be found among them. These continue breeding for several generations, ultimately giving place to the original type, and by the last of April none can be found. Why this change of form occurs is yet a mystery, and needs further investigation. Towards the end, all seem to be parasitized by a *Trioxys*, *T. testaceipes* Cresson, which thoroughly eradicates them.

34. *S. solanifolii*, n. sp.

Wingless female.—Length .12 inch. Elongate ovate and of a pale yellowish green color; beak short, not reaching middle coxæ, pale, tip black; antennæ 7-jointed, slightly reaching beyond abdomen, situated on large tubercles, pale greenish, joints infuscated, 6th joint shortest, dark,

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7th longest, brown; eyes red; honey tubes very long, reaching considerably beyond abdomen, slightly thickened at base, infuscated at tip; style short, conical, greenish; coxæ shining and yellowish, feet black.

♂. Length .05 inch. Black. Beak reaching to middle coxæ, apical half black; antennæ black, hardly reaching to middle of abdomen; honey tubes rather short, black; all coxae black, anterior and middle legs pale greenish, tips of tibiae and feet black, posterior pair, excepting apical half of femora, which is greenish, brown.

Only two males were secured out of hundreds of apterous individuals, and these are remarkable for being so much smaller than the females.

Found feeding on the Pepper Vine, *Solanum jasminoides*.

THE HOP-VINE BORER.

BY CHARLES R. DODGE, WASHINGTON, D. C.

The casual reader, calling to mind only the half dozen hop-vines usually seen about the kitchen garden, or trailing upon some farm outbuilding, can hardly realize the possible losses to hop growers by insects. According to the last census (for 1879) New York State alone had over 39,000 acres in hop yards, producing nearly 22 millions of pounds of hops, which, at an average of 28c. per lb., would aggregate a value of over six million dollars. Bearing these figures in mind, with an annual loss of 10 per cent. from only one insect—the hop borer—(and 25 to 50 per cent. of injury has been reported) a loss of $600,000 would result in this single State.

With such a destructive agent in the hop field, is it not a little singular that there is little or nothing "in the books" on the subject, and that the pest is in all probability an unknown and undescribed species? I am not able to give its name—Prof. Comstock writes me he is working it up—but as I have accumulated a mass of interesting data on the subject in my census work, I deem it proper to make known now the experience of intelligent growers in different sections of the country, for the benefit of those who have not yet learned how to fight the pest, leaving the scientific name and details of habits and natural history to be supplied hereafter.

The only mention that I can find of an insect boring into the crown of the hop plant, in the manner set forth by my numerous correspondents,

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occurs on page 33 of the Report of the Entomological Society of Ontario for 1872, by Rev. C. J. S. Bethune. As an appendix to his paper on Hop Insects, he gives descriptions of an unknown larva feeding "upon the crown of the root," and which he was unable to rear. The size of the larvæ and the general points of description agree so well with the unscientific descriptions given by my correspondents, the growers, that I unhesitatingly pronounce them to be the destructive hop borers, which are the subject of this paper.

The pest has been known to cultivators of the hop for many years—indeed it is reported from Oneida county that it has always been known in the locality—and other hop growing districts have felt its presence for longer or shorter periods. In Juneau county, Wisconsin, it was first noticed in 1867, while the observer in Waupaca county had not noticed it prior to 1881. The percentage of destruction varies in different sections from almost nothing, where kept under control, or yards are new, to 25, 50, and even a greater percentage where the yards are old, badly infested, or not looked after. These facts lead a New York grower to state, in his opinion, that it is best to abandon yards after six or eight years' culture, and change to new ground, for "grubs will get into a yard after two or three years, gradually increase, and in eight or ten years spoil the yard." Other growers contend that only the yards of the ignorant and shiftless are ever damaged to any extent by the borer.

I shall not attempt to give a description of the larva here further than to say that all correspondents agree in the statement that it is an inch and a quarter to an inch and a half in length, and three-sixteenths to one-fourth inch in diameter at maturity, whitish or light gray in color with a dark head.

As soon as the vines start from the ground in May and June, and when but a few inches high, the mother insect begins the attack by depositing her eggs upon them. The subsequent injury is thus described by Mr. Pierpont, a large grower of Ontario county:

"The warm sun hatching the egg deposited in the head of the hop vine, soon after it is out of the ground, it soon becomes a lively worm about one-fourth of an inch in length, subsisting upon the sap of the vine. It leaves the head of the vine soon after hatching, enters the ground, bores to the centre of the vine and works up an inch or two, finally locating where the vine starts from the crown, eating at this point and at the crown until the vine is nearly or quite destroyed, and the crown weakened by water getting in, causing decay, and finally the destruction of the entire hill."

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Another report states that the insect begins work in the latter part of June by eating into the tender vines where they start from the old crown or bed root; and unless prevented, will eat the vine entirely off, thus destroying the crop; "many times they poison the root so that the whole hill dies." Old yards die from this cause more than any other, as the borer prevails more in old than in newer ones.

Another grower states that the damage commences about the last of May or first of June, when "the head of the vine will appear slightly bent or curved, if compared with sound ones. The grub, after feeding a little time in the heart of the head, drops to the ground and makes its way into the heart of the vine below the surface of the ground, working deeper as it grows larger. The vine wilts and finally dies."

There is great diversity of opinion among growers as to the best means of ridding a yard of these pests. A few take for granted that there is no remedy, leaving the skunks to carry on the warfare alone; and right here it may be stated that growers east and west speak most favorably of the friendly offices of this much despised animal, in the hop yard. Salt is mentioned by many growers as a remedy. It is put on after the vine has become somewhat toughened, from middle to last of June, salt on the tender new stalks killing them in a short time. Lime, ashes, sulphur, &c., are also recommended, but doubtless do little real good. Some growers emulate the skunks by digging out the grubs, often doing more damage than the pests themselves.

Mr. Pierpont says an experienced tyer of hops can tell at a glance the head containing a worm, which is crushed in an instant, but this process can only be practiced for a few days, as the worms leave the head soon after hatching. Next to the crushing process a useful remedy is to hill the hops as soon as possible and give the yard thorough cultivation. The hilling causes fibrous roots to put out above the operations of the grub and save to some extent the crop.

The most detailed statement of experience, and it seems to me the best remedial agency or means of prevention, is furnished by Mr. J. F. Clark, a grower of Otsego county, New York, who writes as follows:

When the vines are well up the poles, and at the first hoeing about the last of May or first of June, the dirt should be carefully worked away from the vine by the hoe; all the dirt remaining between the vines must be carefully worked out with a sharpened stick, so that all the vines will be left bare as low down as where they leave the bed root; thus they become

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toughened by the weather and are not so attractive to the grub. Immediately after this operation, a good handful of the following compost should be applied directly aronnd the root and vine: Take equal parts of salt, quick-lime and hen-manure; place the lime on the floor first, and throw on water enough to thoroughly slack it; immediately spread the salt on top, following with the hen-manure. When the lime is well slacked, mix the whole thoroughly, and in a couple of weeks it will be ready for use, as above. Do not hill up the hops until the latter part of July or first of August, and the yard will not suffer any from grubs, but will remain clean and free from weeds the remainder of the season. When yards are hilled earlier than stated above, the grub sometimes works in them more than in late hilled ones.

To return to the skunks. They seem to have acquired the digging-out process to perfection—far better than the hop grower—as they are able to dig around the hills without the least injury to the vines. In Juneau county, Wisconsin, this little fellow—with an appetite for juicy grubs only equalled in degree by the pungency of his perfume—is the only positive remedy, as he works about the hop-hills or roots, cleaning out the worms in a few nights. One grower says: "I have seen ten acres where not a dozen hills would escape their little noses."

It is worthy of note that in a majority of cases the growers report the borer as the most injurious insect in the hop yard, not excepting the hop-aphis.

LEAF-MINING ANTHOMYIDÆ.

BY J. A. LINTNER, ALBANY, N. Y.

Among our American species of Anthomyidæ, none have hitherto been known as leaf-miners. Several are depredators on the roots of garden vegetables, as indicated by the specific names of *Anthomyia ceparum*, *A. brassicæ* and *A. raphani* (the onion fly, cabbage fly and radish fly); some occur in excrementa, and one, a few years ago, was discovered as preying upon the eggs of the Rocky Mountain locust. During last year and the preceding a species *(A. betæ)* which had been almost unknown since its publication in 1860, has been seriously damaging the leaves of beets, in England, by mining them in tortuous channels and large blotches,

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causing them to shrivel, dry up and die. In two counties alone, 1,624 acres of mangolds were infested (Ormerod). This last summer some Anthomyiæ larvæ were discovered by me in Middleburgh, N. Y., extensively mining the leaves of the garden beet *(Beta vulgaris)*. Judging from published descriptions and figures, I believed it to be identical with the European species of the same habits, and that it had been a recent importation thence. Examples of the eggs, larvæ, puparia and flies were sent by me to Mr. R. H. Meade, of Bradford, England, who has been recently making special study of the Anthomians, and particularly of the North American species, as may be seen in a paper in the March number of the last volume (xiii) of the CANADIAN ENTOMOLOGIST, giving the result of his study of the collections in this family, belonging to the Museum of Comparative Zoology at Cambridge, Mass. Mr. Meade finds, among the examples which I sent to him, reared by me from my larval collections at Middleburgh, no less than three distinct species—all differing from *A. betæ*—two believed to be undescribed—and one identified as *Chortophila floccosa* Macq. It seems somewhat remarkable that all these should have been obtained from larvæ feeding at the same time, upon a small garden bed of beets, containing about fifty square feet of surface. The description and general history of the new species will probably be given in my forthcoming Annual Report.

NOTES ON ISOSOMA ELYMI, FRENCH.

BY G. H. FRENCH, CARBONDALE, ILL.

In my notes in the March number of the CAN. ENT., the idea is conveyed that this species obtained from the wild Canada rye grass, may prove to be identical with the wingless form obtained by Prof. Riley and myself from wheat stalks, and which Prof. Riley has since named in the American Naturalist, *I. Tritici*. At the same time doubt was expressed as to their identity, because at the time of writing there were still larvæ in the grass straws, while *I. Tritici* pupated in the fall, both in the breeding jars and in the field. Since the article mentioned has appeared, I have

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obtained from my grass stalks several more specimens, and I believe the two forms to be entirely distinct. A specimen was sent to Prof. Riley, upon the receipt of which he wrote as follows:

"It is undoubtedly distinct from *I. Tritici*, as is shown not only by the greater length, stouter body, darker color of the antennal scape and constancy of the winged form, but also by the punctuation (most markedly), by the shape of the mesothoracic scutum, and by the color of the mesoscutar parapsides. It comes in fact nearer to *Hordei* than to *Tritici*, though, as you say, it is well distinguished from the former by the punctuation."

Five specimens were obtained. These measured: two .12, one .14 and two .15 of an inch in length, and all were winged females, the male not being as yet known. The body robust, much like *Hordei*, the head and thorax rather coarsely punctured, but less so than in *Hordei*. The scape of the antennæ black, the rest brownish black; legs black, the articulations and feet, except the last joint, tawny, the tibiæ scarcely lighter than the femurs and trochanters. Spot on side of prothorax and tips of ovipositor tawny. This is less hairy than *Tritici*, more in that respect like *Hordei*. It may be stated here also that it differs from *Hordei* in the place where the larvæ are found, these being on the interior of the culm in the central hollow, and making no galls, while the larvæ of *Hordei* are found in galls in the outside tissue of the culms.

CORRESPONDENCE.

THE DEVELOPMENT OF A LUNA.

DEAR SIR,—

On the evening of the 12th of April, being at the residence of Mr. J. Johnston, a noise proceeding from his hatching box attracted his attention. Upon looking for the cause, he found a Luna just emerged, the fifth from a batch of nine cocoons which he had raised from the egg. Its body and wings seemed to be quite dry, and were a pure downy white, with the exception of the costal band, which appeared disproportionately

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large, and a minute dark speck for the eye spot. It was remarkably active and did a great deal of rapid travelling before it came to rest, which it did at last quite suddenly on the end of a twig, and then never moved except to better secure its foothold. Mr. Johnston placed it in a suitable position under the full light of the lamp, that we might watch its progress to maturity. The first change noticed was the appearance of a bright green spot near the base of the front wing, and as that enlarged the wing expanded, very slowly at first, but more rapidly as it increased in size, the green coloring matter flowing along between the upper and under membrane of the wing, becoming more delicate in its shade as it spread first along the front of the wing, and had reached the apex before it extended through the inner half; but by the time it had touched the extremity of the whole outer angle the size, form and color of the wing were complete.

In the meantime the hind wing had not yet doubled its original size, with the part from which the tail was to come showing as a slight break on an otherwise even edge; the same routine was followed in the development of the hind wing as in that of the front, and by the time the broad part of the wing had attained its full size, the tail was a little more than half an inch long and very much crumpled. This was the last part to expand, but as the fluid passed into it, it also took size and form. The whole time occupied in the operation, from first seeing it until it was completed, was about one hour and three quarters.

J. Alston Moffat.

Dear Sir,—

I send the following from my Entomological notes: October 10, 1881, I discovered a male *Pieris rapae* coupling with a female *Pieris protodice*. I placed over them a wire screen, as they were in a bunch of mustard. Next morning I discovered that the male was dead. The female soon deposited (in open day) her eggs on the mustard plants. They hatched out and a part of them moulted the second time, but they finally all perished.

On Dec. 27, 1881, and February 15, 1882, I disturbed some boards in my garden, when a female *Aletia argilacea* in each case flew out. They were captured; the first was perfect, the latter not quite fresh. As this has been the most remarkably warm winter we ever experienced in Wisconsin, it is not strange that the *Aletia* could survive. On Feb. 15th the

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farmers were plowing, bluebirds, robins, meadow-larks, red-headed woodpeckers and cedar birds were numerous.

P. R. Hoy, Racine, Wisconsin.

REMARKS ON THE DESCRIPTION OF CAPIS CURVATA, GROTE.

Dear Sir,—

In Vol. xiv of the Canadian Entomologist, at p. 20, Mr. A. R. Grote described *Capis curvata*, n. g. et sp. As a generic description this is certainly an extraordinary specimen of incomplete work. The species might be recognized, but the genus certainly can not be from the description. Genera are supposed to be based only on structural characters, and I presume that the remarks on structure contained in the description referred to, apply to the genus. Let us see of what these consist: "Antennæ simple"—an unimportant generic character, for many of the genera have the antennæ of its species both simple, ciliate and pectinate. "Ocelli."—Considering that there are 250 or more genera to which this can be applied, this does not help us much. "Labial palpi moderately projected, 3rd article short, a little depending."—This will apply to the majority of the Deltoidæ, and to many of the other genera; how they are projected, whether curved upwards or straight, Mr. Grote does not say; neither does he state how the palpi are clothed—a very important character in the Deltoidæ. "The form and outline of *Lisyrhypena** (? Sisyrhypena), but the wings shorter and broader." What form and outline has Sisryhypena? Is the student expected to hunt up the description of that genus, only to find that the wings of that genus are compared with that of some other?

No one knows better than Mr. Grote the essentials of a good generic description, but he entirely omits any reference to the eyes, whether hairy, lashed or naked; there is no mention of the tibiæ, whether spinulated or not; no mention of the character of the vestiture, whether hairy or scaly, and nothing said of the tuftings, if any, or whether they are entirely absent.

There is doubt and trouble enough to assail the student in the older works, without adding to his burdens such descriptions as that of *Capis*, and expecting him to recognize it.

John B. Smith, New York.

* *Lisyrhypena* was a typographical error. It should have been *Sisyrhypena*.—Ed. C. E.

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THE PICKLED FRUIT FLY—DROSOPHILA AMPELOPHILA, Loew.

BY G. J. BOWLES, MONTREAL.

In August, 1879, I met with a small Dipterous fly, *Drosophila ampelophila* Loew, in considerable numbers, and as the subject is of interest to entomologists, I give the result of my observations. I have to

Fig. 10.—*Drosophila ampelophila*: Fly and Wing. Magnified 10 diameters.

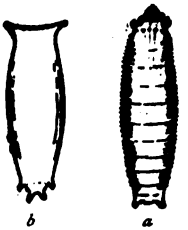

Fig. 11.—*Drosophila ampelophila*: *a*, Larva; *b*, Pupa. Magnified 7 diameters.

thank Professor Hagen, of Cambridge, for the determination of the species and other information, and also Professor Lintner, of Albany, for a copy of his article in the "Country Gentleman" of 1st Jan'y, 1880, on this insect, and from which I have largely drawn.

With regard to the genus, Professor Lintner says: "Twenty-five North American species of *Drosophila* are catalogued, which have all, with the exception of three species common to Europe and America, been described by Dr. Loew, the distinguished Prussian Dipterist, and Mr. Walker, of the British Museum. They have not been studied by our American entomologists, and consequently nothing is known of their habits. I find no reference to a single determined species by any of our writers." In the "American Naturalist," vol. 2, page 641, an unknown species of *Drosophila* is noticed as infesting apples, preferring the earlier varieties. The larvæ penetrate the interior of the apple in every direction, and if there are several working together, render it quite unfit for use.

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Dr. Packard, in his "Guide," page 415, figures an unknown species as the "Apple Fly," which is believed to be the above species. Mr. Walsh in vol. 2 of the "Practical Entomologist," also gives a brief notice of a larva supposed to be that of a species of *Drosophila*, and which also were injurious to an apple crop in Vermont to the extent of about half its value, by boring the fruit in every direction.

Professor Lintner further says: "The different species of *Drosophila* vary considerably in their habits, as we learn from European writers; and, indeed, the same species seems often to occur under apparently quite different conditions. The larvæ of the European *D. cellaris* occur in fermented liquids in cellars, as wine, cider, vinegar and beer, and also in decayed potatoes. *D. aceti* Kol. infests decayed fruits. Its larvæ occupy about eight weeks in attaining their growth, and their pupal state lasts for ten or twelve days. The flies appear in May and June. *D. funebris* has been reared from pupa taken from mushrooms. It is sometimes known as the vinegar fly. Another European species, *D. flava*, is stated by Curtis to mine the leaves of turnips, raising blister-like elevations on their upper surface."

The present species, *D. ampelophila*, is described by Loew in his Centuria Secunda (Dipt. Amer. Sept. indigena), No. 99, page 101. It is exceedingly common (Professor Hagen states) in the southern parts of Middle Europe and in Southern Africa, but the only localities given for it in America, in Loew and Osten Sacken's Catalogue, are the District of Columbia and Cuba. Professor Lintner, however, has bred it in New York; it also occurs in Pennsylvania, and now Montreal must be added to the list. I also think, from observations made in Quebec, that it, or an allied species, is found there. At any rate, this immense area of distribution for such an insignificant insect is very remarkable.

Like the other species of this genus, and so many other dipterous insects, the larva of *ampelophila* feeds on decaying or fermenting vegetable matter. Professor Lintner bred it from pickled plums; in Pennsylvania it fed on decaying peaches, and I found it in pickled raspberries. An earthenware jar had been nearly filled with this fruit and vinegar, prepared by the good housewife for the purpose of making that favorite drink (in Canada at least) called raspberry vinegar. On opening the jar about ten days afterwards (16th August, 1879) it was found to be swarming with the larvæ and cocoons of the insect. Hundreds of the larvæ were crawling on the sides of the jar and the under side of the cover, while pupæ were

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found abundantly, singly and in clusters, particularly where the cover touched the top of the jar. The short time required for the production of so many individuals was surprising. I half filled a covered tumbler with the pickled raspberries and larvæ, and they continued to produce flies for several weeks. I regret not having more attentively observed the exact time required for the different stages, and can only say that its growth from the egg must be very rapid, and its pupal state does not last longer than ten or twelve days.

The larvæ, when full grown, are nearly one-fourth of an inch long, somewhat tapering towards the head, which is small; and are sparsely covered with minute hairs, particularly on the divisions of the segments. They have no feet, but can travel quite rapidly on glass, seeming to retain their hold by a glutinous condition of the skin, and moving by extending and contracting their bodies. They seemed to exist with ease either in the vinegar or the air, moving through the former in search of food, and sometimes coming out of it, and either resting or moving about on the glass sides of the vessel. Their bodies were quite transparent, and under the microscope their internal organs could easily be seen. At both ends of their bodies are curious projections or tubercles, which are also seen in the pupa.

The puparium is about three-sixteenth inch long, oval in shape, and yellowish brown in color, with the tubercles at head and tail before referred to.

The fly measures about one-eighth of an inch in length, with a large rounded thorax, long legs, and broad iridescent wings. The whole insect is yellowish in color, and very hairy, even to the proboscis. Some of the hairs on the head bear three or four branches. The wing forms a very beautiful object for the microscope.

Last year the flies were attracted to some raspberry wine in process of fermentation, hovering about the jars and alighting upon the corks, evidently seeking for an opening through which they might pass to lay their eggs. It is doubtless in this way that fruit is attacked by this or some allied species. The minute fly effects an entrance beneath a not closely-fitting lid, and deposits its eggs on the fruit, or upon the side of the jar, whence the young larvæ make their way to the fruit, or find their sustenance in the liquid.

During the past summer I was desirous of again testing the matter. A few raspberries, with a small quantity of vinegar, placed in a pickle

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bottle with a loose cover, were quite sufficient. A fortnight afterwards, a number of larvæ were seen in the bottle, and several pupæ were attached to its sides. Absence from home, however, interfered with the carrying out of the experiment. It could easily be tried this season by some of our entomologists, and the time required for the transformations of this curious fly be determined, as well as the further extent of its distribution.

The outline drawings were made under the microscope, and give a fair idea of the insect. Every part of the fly is covered with hairs of different lengths, as indicated in the figure. The branched hair on the head is faithfully copied from a specimen, but in others it was not so largely developed. The wings are beautifully edged with hairs, and the membrane is also studded with them. The fly was drawn in the position given, so as to show its extremely long legs, and the curious shape of the thorax and abdomen.

REMARKS ON AGONODERUS COMMA FAB., PALLIPES FAB., RUGICOLLIS LEC., AND TACHYCELLUS *(Bradycellus)* ATRIMEDIUS SAY.

BY JOHN HAMILTON, ALLEGHENY, PA.

Experience in exchanging Coleoptera shows that the first two and the last of these forms are greatly confused in collections. Their appearances are so similar as easily to deceive, and they are only to be separated by a close observance of two or three characters. *Comma* and *atrimedius* are abundant here, and *pallipes* is not rare. *Comma* and *pallipes* are usually confounded, the former being labelled *pallipes;* and *atrimedius* is often marked *pallipes* also. The typical *comma* has a black vitta on each elytron extending from the first to the fifth stria, which does not reach the apex, and may be more or less abbreviated anteriorly. The vitta on each elytron is therefore separated by a yellow suture. The scutellar stria is *long*. The typical *pallipes* has a broad black vitta on the disk of the elytra extending from the fourth stria on one side to the same on the other, and not separated by a yellow suture. It does not reach the apex and may be abbreviated in front, in which case it is narrowed towards the scutellum. The scutellar stria is *short*. The thoracic characters are

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omitted here, being so inconstant as to be of no diagnostic value. Had all the specimens of each species the typical coloration as given, recognition by this character would be easy; but the extent of variation is so great as to render it absolutely useless. While I have not yet seen a specimen of *comma* without the yellow suture, many specimens of *pallipes* occur with it where the broad elytral vitta is abbreviated and disintegrated so as to form a short, narrow vitta on each side. The vitta of *comma* is similarly reduced, and the separation by color becomes impossible. In other specimens of each the colors are so suffused and blended as to present no typical characters.

The length of the scutellar striæ, then, is the only character to be relied on for separation. That of *comma* is said to be *long;* that of *pallipes, short.* Neglect to define the relative lengths, no doubt, gives rise to the confusion where the two species do not inhabit together, and material is not at hand for comparison.

In *pallipes* this stria may be termed rudimentary. The examination of near one hundred specimens shows it to be merely basal, and not to extend notably along the plane of the elytron behind the commencement of the declivity, while in *comma* it is quite conspicuous, and about half a line in length.

Rugicollis is Californian. The scutellar stria is as in *pallipes.* The typical specimens have a short black vitta on each elytron from before the middle backwards, and occupying the 2nd, 3rd and 4th striæ. Specimens of *pallipes* occur with exactly the same marking. Apart from a certain microscopic rugosity of the thorax, and a little less convexity of the elytral interstices, both of which may be evanescent in a large series, I see nothing to distinguish them, except locality.

Tachycellus (Brachycellus) atrimedius.—Many individuals of this species simulate in the form of the thorax and in coloration of the elytra specimens of the foregoing. The scutellar stria is as in *pallipes.* This at once distinguishes it from *comma.* Besides the generic character of the mentum, the antennæ and hind tarsi separate it from *pallipes* readily. The three basal joints of the antennæ are *glabrous,* and the tarsi are *long* and *narrow,* the first joint being one-half longer than the second. In *pallipes,* etc., the same tarsi are short, the joints broad and hairy. The typical *atrimedius* has the hind angles of the thorax sharply rectangular, but in many specimens they are considerably obtuse, and the four species

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approximate so closely in this respect in individuals that this character fails.

The above forms can all be very satisfactorily determined where they depart from typical marks, by the observance of the above characters, which may be thus stated :

Hind tarsi *short*, joints not longer than wide.
Scutellar striæ *long*. *Comma*.
" *short*. *Pallipes*.
" " Thorax usually finely rugose (California). *Rugicollis*.
Hind tarsi *long*, joints narrow, first *one-half* longer than second.
Scutellar striæ short. Three basal joints of antennæ *glabrous*. *Tachycellus atrimedius*.

This paper is not intended to touch on the question of whether the three first mentioned are species, or at most, varieties. Say did not separate *pallipes* and *comma;* the species now recognized as *comma* he describes by the former name, and his variety B is the true *pallipes* Fab., according to the bibliography.

The American Entomologist, vol. iii., p. 154, states, as the opinion of Dr. G. H. Horn, that *comma* and *rugicollis* are synonymous with *pallipes*.

NORTH AMERICAN GEOMETRIDÆ.

BY A. R. GROTE.

I have indicated in this short paper where the types of my Geometrid species are to be found, to the best of my knowledge, and I have given such additional information as I am possessed of with regard to the species. I have followed the classification of Dr. Packard, except in a few instances where I have found reasons to prefer other names. I refer to my paper, Can. Ent., 8, 152, for a review of the synonymy of certain species. Two species, one described by Dr. Harvey (viz., *Endropia Warneri*), have been re-named by Dr. Packard, who calls Dr. Harvey's species *Apiciaria*. As to whether we must put the terminations *aria* and *ata* (accordingly as the ♂ antennæ are pectinate or not) I cannot attempt to decide. I think it is advisable to bear this rule in mind when naming

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species, but I would not change therefore any names already in use. Especially do I think it unadvisable to place the termination after a proper name. I should call the *Endropia*, *E. Warneri*, not *E. Warneraria*.

To the following names of our species the reference to the plate is given where they have been figured. The type of *Eutrapela* is the European *Lunaria*. I would therefore retain Guenée's name *Choerodes* for the genus of which *Transversata* is the type. With this, our highest Geometrid, I would commence the family. Dr. Packard begins with the lowest genera. The Brooklyn "Check List" is, in the main, a transcription of Packard, and, in this family, reverses its ordinary procedure, which is to commence with the supposed highest genera and end with the lowest.

Tetracis Lorata Gr. Proc. Ent. Soc. Phil., 3, 91, 1864.

This is a well known insect, the most simply marked and delicately colored of the genus, and also one of our largest species. The larva is described by Mr. Goodell, Can. Ent. 9, 62. It was found on the Sweet Fern (*Comptonia Asplenifolia*). The moth is figured in Dr. Packard's Monograph. Unless the types are in the Philadelphia collection, I do not know where they now are, the species being described so long (eighteen years) ago. It is of little consequence, as there is no doubt about it.

Tetracis Coloradaria G. & R., Ann. N. Y. Lyc. Nat. Hist., vol. 8, 1767, pl. 2, fig. 11, ♀.

Dr. Packard figures the ♂, plate 12, fig. 47, and refers the moth to *Tetracis*. The original figure is colored. The type may be in the Central Park collection, and is then probably injured, as the "Grote & Robinson" collection, deposited there, has had little attention. There is no doubt as to the species, which is not rare in Western collections.

Drepanodes Puber G. & R., Ann. N. Y. Lyc. N. Hist., vol. 8, 1867, pl. 1, fig. 1, ♂.

The original figure is colored. The type in my collection. Dr Packard keeps our name, but the Brooklyn Check List puts *aria* after it quite unnecessarily. Dr. Packard figures the ♂, plate 12, fig. 35. I do not know the female.

Drepanodes Sesquilinea Grote.

Dr. Packard figures the ♂ under the name *varus*, plate 12, fig. 36.

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The ♂ type is in my collection from Alabama. Dr. Packard says: "A careful examination convinces me that the males which I had heretofore regarded as distinct from *varus* (labelled *sesquilinea* by Mr. Grote) are really the males of *D. varus*, of which heretofore we have only had the females."

Drepanodes Varus G. & R., Ann. N. Y. Lyc. N. Hist., plate 15 A, fig. 2, ♀.

The type, with that of *aquosus*, was not returned by Dr. Packard to my recollection. The original figures of both are colored. They are regarded as forms of one species by Dr. Packard, who refers his *Juniperaria* as synonymous. I have little doubt that Dr. Packard is entirely correct and that we have to do with a single variable species, which Dr. Packard calls *Varus*, and which has received four names. The Brooklyn "Check List" calls the species "Varia," which is entirely inaccurate, the two words being quite distinct.

Endropia Vinosaria G. & R. Ann. N. Y. Lyc., pl. 15 A, fig. 4.

Identified by Dr. Packard with Mr. Walker's *Madusaria* and *Oponearia;* probably also described by him as *Astylusaria*. We had previously published the same facts, Tr. Am. Ent. Soc. 1868, p. 15, after our visit to the British Museum.

Endropia Arefactaria G. & R., Ann. N. Y. Lyc., pl. 15 A, fig. 7.

Larger than *Amoenaria*, of which in the Philadelphia collection I determined specimens. Considered the same by Dr. Packard. I am of the opinion that it is a variety, but not strictly the same as Guenée's species, which is smaller and brighter. I do not think that Dr. Packard has seen the exact equivalent of Guenée's species because (as I recollect) the Philadelphia specimens agreed fairly with his figure, while Dr. Packard says his material does not agree with Guenée's figure, but perfectly with his description. Dr. Packard's figure is *Arefactaria*, agreeing with ours.

Ellopia Bibularia G. & R., Ann. N. Y. Lyc., pl. 15 A, fig. 8, ♂.

Ellopia Pellucidaria G. & R., Ann. N. Y. Lyc., pl. 15 A, fig. 9, ♀.

Identified as sexes of one variable species by Dr. Packard and as previously described by Walker as *Ellopia seminudaria*. Dr. Packard says: "If I had had Mr. Grote's types alone of *bibularia* ♂ and *pellucidaria* ♀, I should have regarded them as distinct; but with the addition of other specimens of both sexes, I have felt compelled to unite them."

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Our figures were colored and give a good idea of the species. I have not seen the types since they were sent to Dr. Packard; but they are now of relatively little importance.

Ellopia Endropiaria G. & R., Ann. N. Y. Lyc. N. H., pl. 15 A, fig. 10, ♀.

This distinctly colored species may be known by the greater number of transverse lines and the strong angulation of the hind wings. Our figure is colored. The type may be in the Central Park collection. There can be no confusion as to the species.

Eucaterva Variaria Grote.

This insect seems allied to *Caterva Catenaria*. The long linear black and white palpi, shorter in the female, are peculiar. It has the appearance of a *Cleoria*. Black and white. The male has a curved extra-basal and a straight outer median blackish band, and discal mark on fore wings. Ground white. The females are of two sorts; one white with sparse black dots over costa at base and collar, and along external margin, and singly elsewhere; the other has the middle of the wing dead black. Fringe spotted. Body white. Hind wings white, dotted or irrorate. Beneath the same. Collected in Arizona; collection of Mr. B. Neumoegen, who has a magnificent collection of *Lepidoptera*, in many respects the finest private collection I have had the opportunity to look over. The European genus *Zerene* does not occur in our fauna.

Chloraspilates Arizonaria Grote.

I have relied on the pale antennal stem, the minute annular discal marks and the obsolete t. p. line, to separate these from the Texan material described by Dr. Packard. Collection of Mr. B. Neumoegen. I am surprised that neither this genus nor *Stenaspilates* are acknowledged by the Brooklyn "Check List." They have many exclusive characters.

Plagodis.

Two species differ by the wider wings being fuller at external margin without the lower excision; the margin is angulate at the middle. In *P. Floscularia*, the short, broad palpi do not exceed the front. The male antennæ are stoutly bipectinate. The front is rather broad and subquadrate between the naked eyes. The tibiæ are not swollen. The hind wings are rounded and wide. In the shape of the fore wings there is a resemblance to *Antepione*, but they are sharper at apices, and, above all,

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longer in this, not unlike typical *Plagodis*. *Floscularia* is of a brilliant yellow color, without inner line on fore wings; the outer line vague, nearly straight. There is an apical red-brown dot; the outer line red-brown on costa, followed by a pinkish-violet patch at internal angle. Hind wings concolorous, hardly paler yellow with linear patch at anal angle. A tender pinkish-violet shade on costa of fore wings above; at base marked costally with dark brown. Body yellow; face pinkish. Venter reddish-pink. Beneath also yellow with markings repeated. The ♀ type of *Floscularia* is in the collection of Mr. G. R. Pilate.

Plagodis Rosaria G. & R.

This species is figured by Dr. Packard as the *Epione Serinaria* of Guenée, and referred to *Plagodis*. Our name for the insect was distributed now many years ago. One unset and somewhat defective type in my collection. Others must be in Central Park or in collections of correspondents. The species was named by us in 1867 or thereabouts. This insect is ochrey yellow and purely pink, not lilac or violet tinted, and without the red apical mark of *Floscularia*.

Nematocampa Expunctaria Grote.

Dr. Packard refers this to *Filamentaria*, without knowing my type from Alabama. This type is either in Philadelphia or in the Peabody Museum, Salem, to the best of my recollection. The texture of the wings seemed to me different, less smooth, closer and heavier than its ally. It appeared to me a decidedly distinct and a little larger species. I believe when the type is examined that it will be found a different species from *Filamentaria*, but as I have not met it again, I am unable to add anything to my original description, CAN. ENT., iv., 101, 1872.

Heliomata Grote.

Of the three lovely species belonging to this genus, *Infulata* and *Cycladata* are figured by Dr. Packard, and I have seen several specimens of them since originally figuring and describing them in the "Proceedings of the Entomological Society of Philadelphia." But the third, *Elaborata*, I have not seen again. The type is, I believe, in Philadelphia; I think my figure and description will serve to identify the species. The species of this genus are probably more or less active by day. They seem to be quite rare, for I have seldom met them in collections. I think I have seen *Cycladata* oftener than its ally. I have never been fortunate enough to find them myself.

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Byssodes Obrussata Grote.

I have followed M. Guenee's terminations in this tropical genus. Our Florida species seems allied to *Paradoxata*, but Guenee does not mention the basal ochre metal-margined line ; the third band at the middle is not marked with a "cellular spot" and I should not call the wings "narrow and elongated" ; our species is also larger. There seems to be a number of species very similar ; and, perhaps, geographical races rather than species. With *Racheospila cupedinaria*, this species from Indian River shows that the *Geometridæ* of South Florida are allied to those of the West Indies. The same fact is exhibited by the representatives of other families of Lepidoptera.

A PHYSIOLOGICAL ARRANGEMENT OF INSECTS.

BY A. H. SWINTON, GUILDFORD, ENGLAND.

Extracted from The Entomologist, vol. xi., p. 255; and Yorkshire Naturalist, vol. vii., p. 45; with author's revision.

Having in times gone by perused with interest certain essays from the pen of the late Edward Newman on the subject of a true or physiological arrangement of Insecta, may I now be allowed to call attention to the additional evidence adducible from the recent investigations of their organs of sensation, a matter I had lately the honor of placing before public attention in my book, Insect Variety.

Viewed in this new light, the presence of auditory organs and well-developed eyes place the Orthoptera first in this list ; and these would be followed by a group of the Homoptera, the *Cicadidæ*, where we find the auditory organs are highly developed, but sight less potent. Next to these appear to come Lepidoptera, where the *Nocturni* stand first as having well-defined auditory organs, and the *Diurni* second from reason of their excellent optic organs. Then would follow Coleoptera, which as far as Europe is concerned, certainly give evidence of possessing auditory apparatuses in two of their groups, the *Lamellicornia* and *Longicornia*, although in the latter the visual organs are imperfect. As far as I can learn, the species of Hymenoptera, Neuroptera and Diptera, have the

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auditory sense, if present, much less potent; but sight, smell and touch are evident and variously developed. This perfectly harmonizes with Newman's circular view, given in the Entomologist, vol. iv., p. 236.

Next, it has been a long standing practice with the authors of works on British Butterflies to treat of the five groups represented in these islands in the following order: *Papilionidæ*, *Nymphalidæ*, *Erycinidæ*, *Lycænidæ* and *Hesperidæ;* but since the first family has close affinity with the last, according to Dr. Scudder and others, the method is only plausible on the principle of extremes meeting; the better arrangement every way being this, *Nymphalidæ*, *Erycinidæ*, *Lycænidæ*, *Papilionidæ* and *Hesperidæ*. Then if physiological reasons could ever be got to prevail over the fancy for having the butterflies first, I would likewise suggest a further arrangement of five groups of moths, showing the development of that structure at the base of the abdomen I attribute with the faculty of hearing, the highest of insect senses, thus: *Noctuina*, *Bombycina*, *Geometrina* and *Sphingina*. Between the *Geometrina* and *Sphingina* come as I consider the butterflies, springing from either group in the species of *Urania* and the *Hesperidæ* respectively. At the best, however, must it appear that any such linear system is to be inferior to the Darwinian method of a theoretical descent, for if lines are not to meet somewhere, what can be made out of case-bearing *Bombycina*, and case-bearing *Tineina* that harmonize like the species of *Incurvaria;* and why is our ghost moth such a strange anomaly? One warm, still evening at the commencement of July, 1881, wandering out butterfly net in hand to watch for the comet to appear over our chalk hill, I came on a spot where an elder bush stood clearly defined against the full harvest moon, over whose ivory blossoms several males of this moth were dancing sideways, little fans full of whimsicality glowing in the dusk like whiting on the hook or calico caught by the sunshine. It was a beautiful and saintly apparition, that held me long before courage was mustered sufficient to catch a couple for the cabinet. Two ghosts however were eventually boxed, and as I spread these out on the setting board I became much struck by the circumstance how little they gave me the idea of a moth, and how little they harmonized with the moths of the group to which they are accredited. Their four wings all alike, wanting the hook and eye to link them, suggested most those of a dragon-fly, and seemed to point to a greater development of the mesothoracic muscles to sustain their increased exertion. Their expansile fans on their hinder femora, and their subterranean larvæ, brought one back to the owl moths

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of the Brazils and the red under wings of the genus *Catocala;* which in their great wing expanse, semi-looping caterpillars, and scent pencils, bridge over the gap between the *Noctuina* and *Geometrina.* Yet as their *wings* want the *hook,* so do their *fans* want the *pouch* that conceals them in these moths. Indeed the ghost moths, and the family of the *Hepialidæ* to which they belong, want so many of those characters that characterize lepidoptera, that one is led on to the supposition that their progenitors never acquired them; and they belong to an older race, that in time past has disseminated itself from Europe to the antipodes of the Maories. Other races, as the species of *Psychidae* and *Coleophora,* whose distribution is equally great, are in their economy scarcely indeed less curious; and the worm-like females of the first, sitting on their caddis-cases composed of straws, bring us very low down indeed in the scale of insect organization and adaptation, while they seem at the same time to transport us back in geological time.

ENTOMOLOGY FOR BEGINNERS.

THE GREAT LEOPARD MOTH—Ecpantheria scribonia Stoll.

BY THE EDITOR.

The larva of this insect is comparatively abundant in the autumn throughout most of the Northern United States and in many parts of Canada. It is found feeding on various species of plants, but most commonly on the wild Sunflower, *Helianthus decapetalus.* It is about two and a half inches long, with a shining black head shaded with reddish on the sides, and a brownish black body. Each segment has an irregular transverse row of tubercles from which spring tufts of rigid shining black hairs, while the spaces between each segment from the fourth to the tenth inclusive are banded with red, the bands being widest and most conspicuous from the sixth to the ninth inclusive. These bands are a striking feature in the appearance of the caterpillar, especially when it is coiled up as shown in figure 12 (after Riley). The color of the under side varies

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from reddish to yellowish brown, feet reddish, prolegs brown, thickly clothed with short hairs.

This larva attains its full growth in the autumn and hybernates during the winter under logs, the loose bark of decaying trees, or other suitable hiding places. By the genial warmth of spring it is aroused from its torpid condition and feeds for a few days upon grass, or almost any other green thing it may meet with. It then constructs a loose cocoon, within which it enters the chrysalis state.

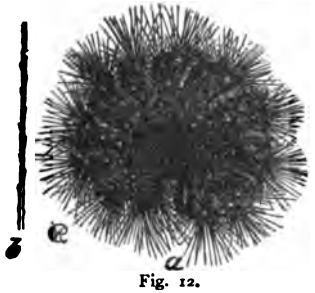

Fig. 12.

The chrysalis is black with a beautiful bloom on its surface, which is easily rubbed off; it has a flattened projection at its hinder extremity, which is tipped with a few bristles.

After remaining about a fortnight in the pupa state, it appears as a unique and very beautiful moth. In figure 13 (after Riley) *a* represents

Fig. 13.

the female, *b* the male. The wings are white, ringed, streaked and spotted with dark brown as shown in the figure. The thorax has ten or twelve

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black spots with a bluish white centre; the upper portion of the body is steel blue, streaked along the middle and sides with yellow or orange; legs white, ringed with black at the extremities. The male differs from the female mainly in his smaller size and narrower abdomen.

PROFESSOR FERNALD'S SYNONYMICAL CATALOGUE OF NORTH AMERICAN TORTRICIDÆ.

BY A. R. GROTE.

The reader of the CANADIAN ENTOMOLOGIST will recall the first paper on the *Tortricidæ*, by Professor Fernald, who has been kind enough to send me advance sheets of his Catalogue of the Family now being published in Philadelphia.

At the time when Professor Fernald commenced his studies he paid me the compliment of asking my advice as to the group of Lepidoptera he should work upon. In advising him to take the *Tortricidæ*, I was influenced by my belief in his patience and scientific ability. No family of Lepidoptera which I have studied, except perhaps the *Phycidæ*, are as difficult as the *Tortrices*, or call for more diligent examination and careful manipulation. I had been bringing together material for a study of the *Tortricidæ*, and had described a few species and the genus *Phaecasiophora*, when Professor Fernald wrote to me. I was thus in a position to be of the slight assistance which Professor Fernald has, I am afraid, overestimated in his original paper alluded to above. But it is difficult to overestimate the importance of Professor Fernald's work and the excellence with which it has been performed. With the valuable aid of Lord Walsingham, Professor Fernald was able to examine personally almost every one of Mr. Walker's types. The types of my friend, the late Mr. C. T. Robinson, had been placed in Professor Fernald's hands before his visit to London, and I had given him all the material brought together by myself, so that no one was in so favorable a position for ascertaining what had been described and what was yet new among our Tortrices. Every American paper which I have seen on the family, since that time, has been issued after the material on which it was based had been determined

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by Professor Fernald, who is our authority on the *Tortricidæ* without a rival. And this position is not an easy one to gain. The little delicate insects are very variable, and in the genus *Teras*, for instance, they change pattern and colors like a kaleidescope. The genera, as in the Deltoids, Phycids, etc., have to be limited by characters offered by the males alone, quite often, and in all cases the entire structure has to be carefully noted in order to locate the species to the best advantage.

All the requirements have been met, and, as a proper conclusion to his labors so far, a breathing place where one can survey the road travelled over, Professor Fernald gives us his very useful *Catalogue*. Having ourselves written a synonymical Catalogue of the *Sphingidæ*, we have a lively sense of the work to be performed in a Family yet more numerous in species and more intricate in synonymy. The student can, however, use Prof. Fernald's Catalogue with the certainty that it is as accurate as it can be made, and he will be very unappreciative if he feels no gratitude to its accomplished author, who has spared no labor in completing his self-imposed task. Professor Fernald, by his moderate views and careful methods, has proved himself a safe guide; at the same time he has shown himself possessed of talents which carry him easily in the front rank among living Entomologists. It would be well if such proofs as Professor Fernald has offered of knowledge of the subject were demanded of all writers of Lists and Catalogues; but I will not pursue this view of the subject any further, nor burden a proper praise of Professor Fernald with remarks which he is too amiable to sanction.

MR. S. H. SCUDDER'S NOMENCLATOR ZOOLOGUS.

BY A. R. GROTE.

Science is much indebted to Mr. Scudder for a great deal of very dry and tiresome work in the preparation of Catalogues. We have already from his pen a list of the generic names used for Butterflies, and now in a thick octavo volume of 376 pages we have a "list of generic names employed in Zoology and Palaeontology to the close of the year 1879, chiefly supplemental to those catalogued by Agassiz and Marschall, or indexed in the Zoological Record."

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The list is beautifully and clearly printed and the proof reading has been exceedingly careful. After having gone over a number of names and after spending some hours with the book, I have found but one error of spelling. The labor of compiling the list has been evidently great, and Mr. Scudder speaks of it in terms which shows how arduous it really was. The author was helped by those to whom he applied for lists of the generic names proposed by them, however, and Prof. Marsh went to the trouble of printing the references to his own numerous genera.

The list can hardly be thoroughly tested by any one student, who can only be expected to know his own genera and those of others in his specialty. In the *Noctuidæ* and the Moths generally I find a larger number of omissions than I should have expected. In the Butterflies I find no reference to the genus *Feniseca*, a name used by Mr. Scudder and all who have written on *Tarquinius* since it was proposed. I also find two mistakes which should not have been made. The genus *Euclemensia* is given as = *Hamadryas* of Boisduval, whereas it was proposed for *Hamadryas* of Clemens, preoccupied by Boisduval and Hübner. Also the genus *Copablepharon* is credited wrongly to me, and the original citation for *Argyrophyes* is not given. If these are fair samples of the reliability of the work, it would be wrong to praise it and its usefulness might be considered doubtful. It is probable, however, that the intention was not to give all the genera (as they have not, I think, been all collated out of the books of which Mr. Scudder gives a list), and the mistakes above pointed out may be exceptions. Of this each student will be able to judge, and it would be well for the work to be publicly examined by different scientists and the mistakes pointed out before Mr. Scudder publishes again on the subject.

The error of spelling alluded to above is on page 130, where *Eufitchia* is written *Eufichia*. It will be of course impossible to get all the names, but about twenty-five names proposed for genera of *Lepidoptera* which I looked for, I could not find in the List. These names were published within twenty years up to 1880. This number is very likely less than the real omissions of names for genera in the order *Lepidoptera*. There has been probably too great reliance placed on the contributions of authors, at the expense of personal research. We cannot suppose that there has been any private influence brought to bear on a compilation of this character, but there has been an effort to display very fully the generic names of certain authorities, while the genera proposed by those who have not

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written much are apparently neglected. But it is precisely such genera which should be brought together in a work of this kind. A number of genera of which it may with confidence be predicted that they will never come into use, are cited, while genera now in constant use are omitted.

BOOK NOTICES.

Bulletin No. 7. Insects Injurious to Forest and Shade Trees, by A. S. Packard, jr., M. D. Issued by the Department of the Interior, U. S. Entomological Commission.; 8vo., pp. 275, with 100 illustrations.

The object of this Bulletin, as stated in the introduction to it, is to give to the public a brief summary of what is up to this time known of the habits and appearance of such insects as are injurious to the more useful kinds of trees. Beginning with the insects injurious to the various species of Oak, the author treats of those which injure the Elm, Hickory, Butternut, Chestnut, Locust, Maple, Poplar, Linden, Birch, Beech, Tulip Tree, Horse Chestnut, Wild Cherry, Ash, Alder, Willow, Pine, Spruce, Balsam, Juniper, Tamarack, Arbor Vitæ, and others. A large proportion of the work is occupied with descriptions of those insects which injure the more important forest trees, such as the Pine and Oak. This is a most useful synopsis of our knowledge in this department, and its issue will no doubt greatly stimulate the progress of Entomology in this practical direction, for while it shows that much has been done in some of the most important departments, in many others our knowledge is extremely scanty. This work is conveniently arranged, and like the other works of this distinguished author, well written in a plain and popular style, and will commend itself to all who are interested in preserving our forests and useful shade trees from destruction by insect foes.

(A Fragment of a) Guide to Practical Work in Elementary Entomology. An outline for the use of students in the Entomological Laboratory of Cornell University, by J. Henry Comstock; 8vo., pp. 35.

This work is divided into two chapters, the first of which treats of the terms denoting the position and direction of parts in insects, the second of the external anatomy of a grasshopper, *Caloptenus femur-rubrum*. A useful guide to all those entering on the study of Entomology.

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Tenth Report of the State Entomologist of the Noxious and Beneficial Insects of the State of Illinois, by Cyrus Thomas, Ph. D., 8vo., pp. 244, illustrated with two plates and 79 wood-cuts; containing articles on the Army Worm, *Leucania unipuncta;* a new Corn Insect, *Diabrotica longicornis;* the Relation of Meteorological Conditions to Insect Development; Descriptive Catalogue of Larvæ; the Larvæ of Butterflies and Moths; and the Hessian Fly. This Report contains mdch that is new in reference to these several subjects, and is a valuable contribution to Entomological literature.

A Bibliography of Fossil Insects, by Samuel H. Scudder, 8vo., pp. 47, being a complete list up to the present time of all known works and papers on fossil insects, arranged in alphabetical order.

Synopsis of the Catocalæ of Illinois, by G. H. French, Carbondale, Ill., containing references to fifty-eight species, followed by instructions for capturing Catocalæ, 8vo., pp. 11, with one wood-cut.

CORRESPONDENCE.

In reply to Mr. John Smith's remarks upon *Capis*, I would state that every student ought to know that in the Deltoids the eyes are always naked, the tibiæ unarmed. It was not necessary to recapitulate characters common to the Group. As I have given a large number of generic descriptions and reviewed in different papers and works the structure of the *Noctuidæ*, for the past twenty years, I think it probable that I gave all the necessary characters, for the moment at least, until the male is discovered, to establish the genus. In the Deltoid *Noctuidæ*, as in the Phycids and Tortricids, sexual structure is of generic value. It is very easy now for Mr. John Smith to have his *Noctuidæ* named, and in response to a private letter from him, I offered to name his material more than a year ago. I am glad he seems to be studying the group, and I shall be happy at any time to name his material and afford him any information in my power. I think if he had applied to me I should have been able to give him the facts as to *Capis* and the Deltoid genera which would have rendered his article unnecessary. For, the structural details mentioned in Mr. John Smith's letter, cited in the paragraph before the last, and for not giving which in connection with *Capis*, I am blamed, are uniform throughout the North American Deltoids so far as I have observed.

A. R. GROTE.

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NOTE ON PAPILIO POLYDAMAS, LINN.

In the Revised Synopsis of Species, commenced in Part 10, Vol. 2, But. N. A., I struck out *Polydamas*, *Villiersii* and *Serion*, for want of authentication. I believe these species have been credited to our fauna on authority of Dr. Boisduval, but if examples of either have been taken within the U. S. during the last twenty-five years, and up to the printing of my Revision, I am not aware of it. However, within the last two months, Dr. Wittfeld, of Indian River, Florida, has taken half a dozen *Polydamas*, one of which he sent me for identification. Although collecting butterflies assiduously for two years past, Dr. Wittfeld had not observed this species before. The larva, according to Boisduval, feeds on Aristolochia. *Serion*, Fabr., is a Jamaican species, and is not likely to have been seen in Florida. *Zonaria*, Butler, = *Serion*, Cramer, is Cuban, and may be also Floridian, but until properly authenticated, I should reject it.

NOTE ON CHIONOBAS TARPEIA, ESPER.

I have recently received from Dr. Staudinger six Siberian examples of this species, showing variation, and am satisfied that I myself have seen nothing American which cnn be called *Tarpeia*. It resembles on upper side C. *Uhleri*, but differs widely on under side. Mr. Butler, in Cat. Satyr., credits *Tarpeia* to Arctic America, and of course his authority decides that question, as he had the British Museum example before him.

W. H. EDWARDS.

A NEW VARIETY OF CATOCALÆ.

Catocala Paleogama Guen.

N. Var. *Annida*.—The whole of the posterior margin, nearly to the middle, of the primaries brownish black. The terminal space brownish gray with a light shade across the middle. The white marking along the *t. p.* and *t. a.* and subterminal lines very prominent.

In the more common form the whole wing is pale brownish gray, except the reniform and subterminal space, from which this var. may readily be distinguished.

This var. is to *Paleogama* what var. *Evelina* is to *Lachrymosa*.

I have made my description from three male specimens.

D. B. FAGER, Carbondale, Illinois.

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The Canadian Entomologist.

VOL. XIV. LONDON, ONT., JULY, 1882. No. 7

THE GRAPE PHYLLOXERA—*Phylloxera vastatrix.*

BY THE EDITOR.

This tiny but formidable foe to the grape vine, which has during the past few years attracted so much attention in Europe and America, has appeared in its worst form, viz., the root-inhabiting type, in Ontario, and is doing a considerable amount of damage in our vineyards. Early this spring the writer received from Mr. A. H. Pettit, of Grimsby, samples of fibrous roots from diseased vines, which had every appearance of being affected by the Phylloxera, but the specimens received were so dried up that if there had been any lice on them they could not be discovered. Request was made for fresh specimens in moist earth, but none were obtained.

On the 19th of July, in company with Mr. J. M. Denton, of London, I visited the vinery of Mr. Richard Stephens, in Westminster, about a mile from London, where we found a number of Concord vines growing in heavy clay soil, which were suffering much from some cause; the foliage had become very yellow and some of the vines appeared to be dying. On examining the roots we could find but few living, and the fibrous roots were covered with the little knotted swellings so characteristic of Phylloxera. On digging around some vines that were less diseased, a number of the lice were discovered on the young, fresh roots, puncturing them, imbibing their juices, and causing disease and death.

On the day following we visited our own vinery, on sandy soil, near London, and detected the same form of disease, but much less pronounced, on Rogers' 15 and some seedlings.

On examining the roots Phylloxera were found in their different stages of egg and larva of various sizes, in comparative abundance. In the case of Mr. Stephens the insects must have been at work for several years to have caused the extent of injury which we saw, but in our own case the invasion is probably a more recent one. We are glad to state that on Mr. Stephens' grounds we found the small mite, *Tyroglyphus phylloxera*, which

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feeds upon the Phylloxera and destroys it, associated with the lice and busy in its useful mission.

Since this insect is now known to be at work in Ontario, and probably to a greater extent than we are at present aware of, a condensed account of its life history will probably be interesting to our readers. The figures are from Prof. Riley's excellent reports, and the facts given mainly gleaned from the writings of this and other authors.

Its progress in Europe has been most alarming, inflicting untold losses in the wine making districts. The destruction it has occasioned in France has been so great that it has become a national calamity which the Government has appointed special agents to enquire into; large sums of money have also been offered as prizes to be given to any one who shall discover an efficient remedy for this insect pest. At the same time it has made alarming progress in Portugal, also in Switzerland and some parts of Germany, and among vines under glass in England. It is a native of America, from whence it has doubtless been carried to France; it is common throughout the greater portion of the United States, and in one of its forms in Canada, but our native grape vines seem to endure the attacks of the insect much better than do those of Europe. Recently it has appeared on the Pacific slope in the fertile vineyards of California, where the European varieties are largely cultivated, and hence its introduction there will probably prove disastrous to grape culture.

This insect is found in two different forms: in one instance on the leaf, where it produces greenish red or yellow galls of various shapes and sizes, and is known as the type *Gallaecola*, or gall-inhabiting; in the other and more destructive form, on the root, known as the type *Radicicola*, or root-inhabiting, causing at first swellings on the young rootlets, followed by decay, which gradually extends to the larger roots as the insects congregate upon them. These two forms will for convenience be treated together.

The first reference made to the gall-producing form was by Dr. Fitch in 1854, in the Transactions of the New York State Agricultural Society, where he described it under the name of *Pemphigus vitifoliæ*. Early in June there appear upon the vine leaves small globular or cup-shaped galls of varying sizes; a section of one of these is shown at *d*, figure 15; they are of a greenish red or yellow color, with their outer surface somewhat uneven and woolly. Figure 14 represents a leaf badly infested with these galls. On opening one of the freshly formed galls, it will be found to

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contain from one to four orange colored lice, many very minute shining, oval, whitish eggs, and usually a considerable number of young lice, not much larger than the eggs and of the same whitish color. Soon the gall becomes over-populated, and the surplus lice wander off through its partly opened mouth on the upper side of the leaf, and establish themselves either on the same leaf or on adjoining young leaves, where the irritation occasioned by their punctures causes the formation of new galls, within which the lice remain. After a time the older lice die, and the galls which they have inhabited open out and gradually become flattened and almost obliterated; hence it may thus happen that the galls on the older leaves on a vine will be empty, while those on the younger ones are swarming with occupants.

Fig. 14.

These galls are very common on the Clinton grape and other varieties of the same type, and are also found to a greater or less extent on most other cultivated sorts. They sometimes occur in such abundance as to cause the leaves to turn brown and drop to the ground, and instances are recorded where many vines have been defoliated from this cause. The number of eggs in a single gall will vary from fifty to four or five hundred, according to the size of it; there are several generations of the lice during the season, and they continue to extend the sphere of their operations during the greater part of the summer. Late in the season, as the leaves become less succulent, the lice seek other quarters and many of them find their way to the roots of the vines, and there establish themselves on the smaller rootlets. By the end of September the galls are usually deserted. In figure 15 we have this type of the insect illustrated; *a* shows a front view of the young louse, and *b* a back view of the same; *c* the egg, *d* a section of one of the galls, *e* a swollen tendril; *f*, *g*, *h*, mature egg-bearing gall lice, lateral, dorsal and ventral views; *i*, antenna, and *j* the two-jointed tarsus.

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When on the roots the lice subsist also by suction, and their punctures result in abnormal swellings on the young rootlets, as shown at *a* in figure 16. These eventually decay, and this decay is not confined to the swollen portions, but involves the adjacent tissue, and thus the insects are induced to betake themselves to fresh portions of the living roots, until at last the larger ones become involved, and they too literally waste away.

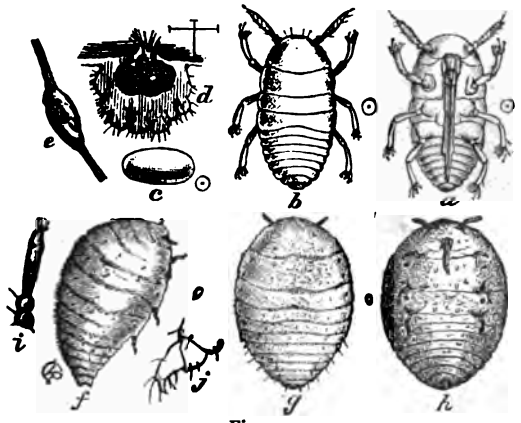

Fig. 15.

In figure 16 we have the root-inhabiting type, *Radicicola*, illustrated; *a*, roots of Clinton vine, showing swellings; *b*, young louse as it appears when hibernating; *c*, *d*, antenna and leg of same; *e*, *f*, *g*, represent the more mature lice. It is also further illustrated in fig. 17, where *a* shows a healthy root, *b* one on which the lice are working, *c* root which is decaying and has been deserted by them; *d d d* indicates how the lice are found on the larger roots; *e*, female pupa seen from above, *f* the same from below; *g*, winged female, dorsal view; *h*, the same, ventral view; *i*, the antenna of the winged insect; *j*, wingless female laying eggs on the roots, while *k* indicates how the punctures of the lice cause the larger roots to rot. Most of these figures are highly magnified; the short lines or dots at the side showing the natural size.

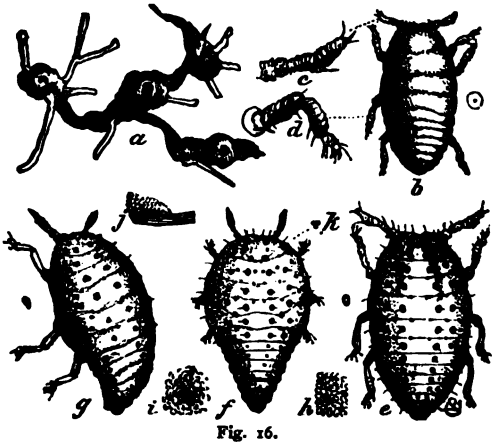

Fig. 16.

During the first year of the insect's presence the outward manifestations

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of the disease are very slight, although the fibrous roots may at this time be covered with the little swellings; but if the attack is severe, the second year the leaves assume a sickly yellowish cast, and the usual vigorous yearly growth of cane is much reduced. Eventually the vine usually dies,

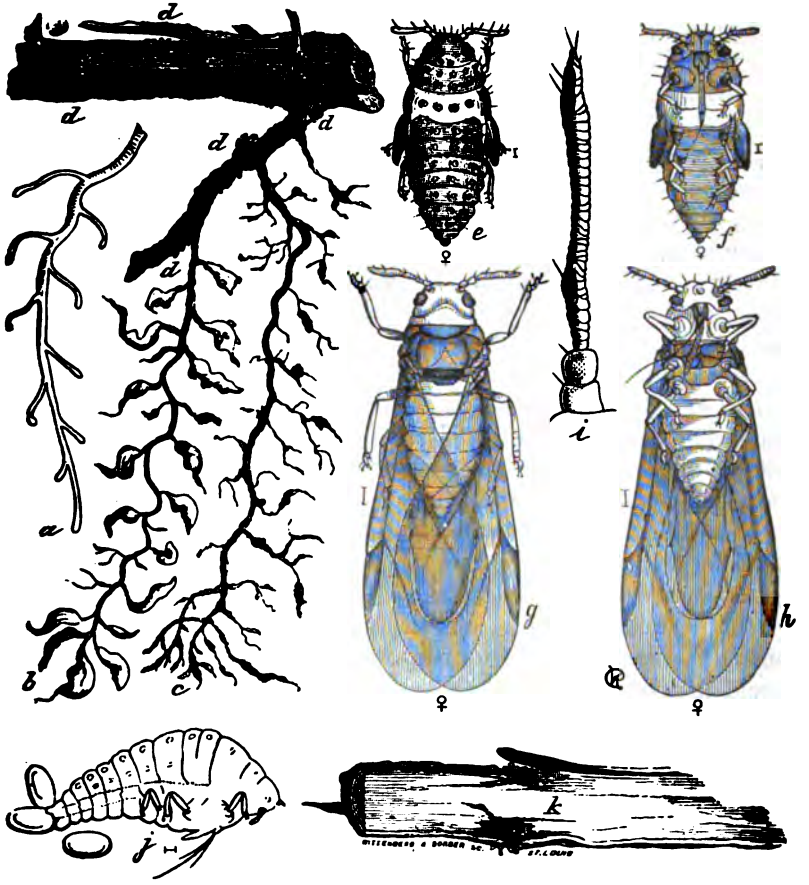

Fig. 17.

but before this takes place, the lice having little or no healthy tissue to work on, leave the dying vine and seek for food elsewhere, either wandering underground among the interlacing roots of adjacent vines, or crawling over the surface of the ground in search of more congenial quarters.

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During the winter many of them remain torpid, and at that season assume a dull brownish color, so like that of the roots to which they are attached, that they are difficult to discover. They have then the appearance shown at *b* in figure 16. With the renewal of growth in the spring, the young lice cast their coats, rapidly increase in size, and appear as shown at *e*, *f*, *g*, in the figure; soon they begin to deposit eggs, these eggs hatch, and the young shortly become also egg-laying mothers like the first, and like them also remain wingless. After several generations of these egg-bearing lice have been produced, a number of individuals about the middle of summer acquire wings. These also are all females, and they issue from the ground, and rising in the air, fly or are carried with the wind to neighboring vineyards, where they deposit eggs on the underside of the leaves among their downy hairs, beneath the loosened bark of the branches and trunk, or in crevices of the ground about the base of the vine. Occasionally individual root lice abandon their underground habits and form galls on the leaves.

The complete life history of this insect is extremely interesting and curious, and those desirous of further information as to the different modifications of form assumed by the insect in the course of its development, will find them given with much minuteness of detail in the 5th, 6th, 7th and 8th Reports on the Insects of Missouri, by C. V. Riley.

Remedies: This is an extremely difficult insect to subdue, and various means for the purpose have been suggested, none of which appear to be entirely satisfactory. Flooding the vineyards where practicable seems to be more successful than any other measure, but the submergence must be total and prolonged to the extent of from twenty-five to thirty days; it should be undertaken in September or October, when it is said that the root lice will be drowned, and the vines come out uninjured.

Bisulphide of carbon is claimed by some to be an efficient remedy; it is introduced into the soil by means of an augur with a hollow shank, into which this liquid is poured; several holes are made about each vine, and two or three ounces of the liquid poured into each hole. Being extremely offensive in odor and very volatile, its vapor permeates the soil in every direction, and is said to kill the lice without injuring the vines. This substance should be handled with caution, as its vapor is very inflammable and explosive. Carbolic acid mixed with water, in the proportion of one part of acid to fifty or one hundred parts of water, has also been used with advantage, poured into two or three holes made around the base of

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each vine with an iron bar to the depth of a foot or more. Soot is also recommended, to be strewed around the vines.

It is stated that the insect is less injurious to vines grown on sandy soil; also to those grown on lands impregnated with salt.

Since large numbers of these insects, both winged and wingless, are known to crawl over the surface of the ground in August and September, it has been suggested to sprinkle the ground about the vines at this period with quicklime, ashes, sulphur, salt or other substances destructive to insect life. The application of fertilizers rich in potash and ammonia have been found useful, such as ashes mixed with stable manure or sal-ammoniac.

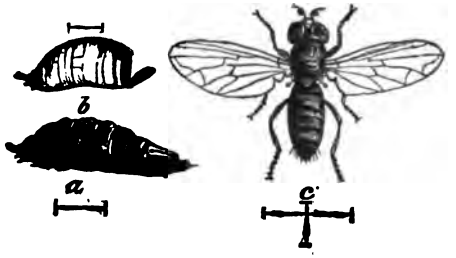

Fig. 18.

A simple remedy for the gall-inhabiting type is to pluck the leaves as soon as they show signs of the galls, and destroy them.

Several species of predaceous insects prey on this louse. A black species of Thrips with white fringed wings deposits its eggs within the gall, which, when hatched, produce larvæ of a blood red color, which play sad havoc among the lice. The larva of a Syrphus fly, *Pipiza radicum*, which feeds on the root louse of the apple, see figure 18, has also been found attacking the Phylloxera. Another useful friend is a small mite, *Tyroglyphus phylloxera*, P. & R., see fig. 19, which attacks and destroys the lice, and associated with this is sometimes found another species, *Hoplophora arctata* Riley, of a very curious form, reminding one of a mussel. The lice are also preyed on by the larva of a Scymnus, a small dull colored lady bird; also by several other species of the lady-bird family, and by the larvæ of lace-wing flies.

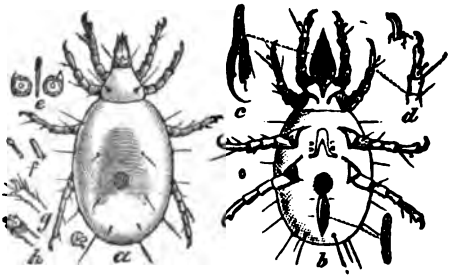

Fig. 19.

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To guard against its introduction into new vineyards, the roots of young vines should be carefully examined before planting, and if knots and lice are found upon them, these latter may be destroyed by immersing the roots in hot soap suds or tobacco water.

Our native American vines are found to withstand the attacks of this insect much better than do those of European origin, hence by grafting the more susceptible varieties on these hardier sorts, the ill effects produced by the lice may in some measure be counteracted. The roots recommended to use as stocks are those of Concord, Clinton, Herbemont, Cunningham, Norton's Virginia, Rentz, Cynthiana, and Taylor. The Clinton, one of the varieties recommended, is particularly liable to the attacks of the gall-producing type of Phylloxera, but the lice are seldom found to any great extent on its roots, and the vine is so vigorous a grower that a slight attack would not produce any perceptible effects.

"EUDAEMONIA JEHOVAH"—A REVIEW.

BY A. R. GROTE.

The describer of species has accomplished his task when he has given the proper Latin names, but it depends largely on the one who catalogues the species, whether these names pass into use or not. In the work of preparing a "New Check List of North American Moths," I have gone over much of the literature bearing on the subject, and the following reflections have presented themselves to me.

In the first place, I have been actuated by a sincere desire to meet the views of the anti-Hübnerists, and avoid the use of old or objectionable names. Professor Riley has brought forward objections to the resuscitation of forgotten or neglected names, and others have written with the same object in view. I found, however, to my surprise, I must confess, that the best Catalogue, that of Staudinger, did not hesitate to introduce names out of use for almost a century; and this merely because they were a very little older than the name in common use. So prominent an insect as *Papilio Podalirius*, is made to appear as *P. Sinon*. And in the "Preface," the necessity for placing the synonymy on a firm basis is given as a reason for enforcing the rule of priority so rigidly. If this can be

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done in Europe, where there exists so large an Entomological public, why should it not be done here, where that public is so limited? For instance, in the genus *Catocala*, I have reinstated *Grynea* of Cramer; but I hardly think that, before my paper appeared, the insect had any name at all in collections, or that the name of *nuptula*, which I rejected, was used to any extent. Outside of the difficulty of deciding what constitutes a name "in use," I think the science is yet so young with us, that no names have been used so much that their abandonment could lead to any confusion or trouble of moment. Certainly if such changes can be made in an important European Catalogue like Staudinger's, there can be no reason for the American Systematist being at all troubled at finding himself obliged to make them. And with the use of Hübner's genera, I find that proportionately more of such names are used by Staudinger than in the older lists of Boisduval, Heydenreich, Gueneé or the English writers, except, perhaps, Stephens. To the writers of the "Brooklyn Check List," I would, in fact, recommend the study of Staudinger's Preface. These writers profess, indeed, much veneration for Staudinger, and the writers whom they somewhat vaguely term "Continental Authors," and it is really worth while to ascertain fully what Staudinger says on this and kindred topics in his "Preface." I think that we can adopt this "Preface" as giving excellent judgment on all, or most of the moot points in nomenclature, and be guided by it. The practice of giving a specific name only once in a Family is discussed on page xviii of the "Preface." This is properly condemned, but it is rightly insisted upon that in two related genera the same specific name should not be used. And where a change has been made for this reason, the new name should be respected even if the species thus re-named should be removed to a quite different genus from the one under which it originally appeared, and where it was re-named to avoid a duplication of the first specific name. Thus I should keep *Puritana* Rob., instead of bringing into use again the original name for the species which was a duplication at the time.

I would, finally, modify the law of priority and not recognize such names as the one proposed by Mr. Strecker at the head of this article. There is only one objection to such names, that they offend the ears of many who are interested in the object they designate. On fair, "common sense" grounds, they should be rejected. And they have no excuse for appearing, since names are more plentiful than species. In the present case, the species should be catalogued under the name *Streckeri*, and no

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reference be made to the original name, which has been used by Mr. Strecker "in vain."

It is not here a question of Orthodoxy, but of taste and decency. While great sacrifices are to be made to secure a stable nomenclature by the enforcement of the law of priority, there is a point where the proposer of objectionable names should meet with a check. Under cover of priority there is no telling how far we might be led, were we obliged to adopt any names that might be proposed. But no student is obliged to use names which appear to him disadvantageous to the comprehension of his subject or the general welfare of his science. The more he is interested about the fact and the less about names and rules, the better. At least he will not trouble himself to use an objectionable term for the sake of priority. And this is the strong point of the anti-Hübnerists. And it would be legitimate were it not shown that Hübner's names are mainly objected to from their being neglected, or insufficiently founded; there can be no reason, where they are well founded, for their further neglect, since their use makes but little trouble at present and what we need is a stable nomenclature. To attain this we must exhaust the application of names at present in literature.

PREPARATORY STAGES OF HOMOPTERA LUNATA, DRURY.

BY G. H. FRENCH, CARBONDALE, ILL.

EGG.—Diameter, .03 inch. Globular in shape, slightly flattened at the base, the apex having a punctured space but no depression; a series of longitudinal ridges from near the base, 20 of which reach the apical space. As these ridges are the same distance apart, there are between those reaching the apex several shorter ones, the number not noted. The depressions between the ridges show slight punctures. Color pale green. Duration of this period 5 days.

YOUNG LARVA.—Length .15 inch, slender, 12 legs, the first and

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second pair of pro-legs mere points. A looper in motion. Color of the middle of the body from joint 2 to 11 pale dull yellow, with a slight leaden hue; head, joint 1 and the anal joint slightly reddish, these parts lacking the leaden hue. All the feet pale. Hairs arising from piliferous spots gray. Head about one third broader than the body. Duration of this period 3 days.

After 1st Moult.—Length .20 inch. The whole of the dorsum pale green with traces of lines only on the thoracic and the posterior segments. On the sides two prominent reddish brown lines separated by a narrow green one. There is a very faint reddish subdorsal line. None of the piliferous spots are prominent except the posterior pair of the dorsal on joint 4, which are slightly enlarged and black. Head pale reddish brown mottled with darker. The first and second pairs of pro-legs a little more prominent. The larvæ are very active. Duration of this period 3 days.

After 2nd Moult.—Length .55 inch. The general color of the dorsum is pale grayish green tinged with brown at the extremities. Dorsal line composed of two greenish white lines with a narrow space of the ground color between. Subdorsal line dull white. On the sides are three stripes separated by narrow white lines. The middle stripe is blackish brown considerably tinged with green on joints 4 and 5, and containing the stigmata. The other two stripes are paler with more green. The general color of head is brown, the stripes of the body extending irregularly over it, though considerably mottled. Feet pale brown. Piliferous spots black, the posterior dorsal pair of joint 4 prominent in color, a little so in elevation. Part of hairs from piliferous spots black, part brown. Venter gray with black spots in the middle of the joints. Duration of this period 4 days.

After 3rd Moult.—Length .75 inch. The dorsal space is in three distinct stripes, separated by two white lines. The dorsal or central stripe has an imperfect faint dorsal line, the rest of the stripe being pale mottled with brownish. The stripe between this and the subdorsal is brown mottled with greenish. The sides striped much as in the last period, the stripes separated by white lines. The upper of the three is like the dorsal stripe, pale inclining to carneous; the second or stigmatal is like the one in the dorsal space. The stripes are a little darker on the thoracic joints than elsewhere. Piliferous spots black, the posterior dorsal pair of joint 4 prominent as before. The articulations or incissures of the joints in the

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middle of the body incline to yellow. The brown and pale brown mottlings of the head, though irregular, seem to follow in a measure the stripes of the body in arrangement. Pro-legs concolorous with the body, thoracic paler. Venter dull white, black in the middle of the joints. Hairs black. Duration of this period, 3 days.

After 4th Moult.—Length 1.05 inches. Marked and colored very much as during the preceding period. Piliferous spots less prominent, except the posterior pair of joint 4. Each one of these contains a white dot with a similar dot in its front. Joint 11 a little raised with the posterior pair of spots tubercular. Duration of this period 3 days.

After 5th Moult.—Length 1.35 inches. The plan of marking of the insect has not changed, but the colors are so modified that the caterpillar has a yellowish brown appearance with a decided chrome yellow tint at the intersection of joints 4 and 5. The piliferous spots are black, but from joint 4 back each is accompanied by a small white spot. In general the piliferous spots have grown less prominent, the posterior on joint 4 about the same, those on joint 11 a little more elevated. The dorsal stripe is a little irregular in outline at the intersection of the joints, consisting of one or more expansions and contractions. The difference in color of the stripes seems to be due to the difference in shade of the brown dots of which the stripes are composed, the yellowish green ground color being about the same. Venter about the shade of the pale stripes, the middle of each joint being brownish black tinged with wine color, these spots being connected.

Mature Larva.—Length 1.45 inches. Width of head .12 inch, of middle of body .18. Head flat, sloping; ocelli 6; in shape and number of ocelli resembling larvæ of Catocalæ. Marked very much as at the beginning of this period, three stripes on the dorsum and three on each side, alternating light and dark, but these are less distinct, approaching a uniform brownish drab; the white spots also less distinct. The first and second pro-legs are about half the length of the others. Venter a little paler than above, with an elliptical reddish brown spot in the centre of each joint. Legs and palpi concolorous with the body, jaws dark brown. Duration of this period 13 days.

Chrysalis.—Length .80 inch, depth of thorax .25 inch; basal abdominal depression very slight. Depth of 4th abdominal joint .27 inch, from this gradually tapering to the end; the wing cases covering five joints in front, the legs and antennæ cases extending the same distance as the

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wings. The tip of abdomen coarsely furrowed and punctured, terminating in two long hooks with several shorter ones arising from the corrugated surface a little way from these. These hooks are fastened in a button or piece of silk of considerable extent at the posterior end of the cocoon; the latter being composed of leaves fastened together, with or without being attached to the box, but not lined on the inside except the space of silk already mentioned. Anterior portion of chrysalis a little produced at the head, no particular organ projecting prominently. Color brown, not very dark, moderately glaucus. Duration of this period 18 days.

This gives a total time from depositing the egg to the imago of 52 days. I should say, however, that this season was very wet during the months of May and June, and after passing the 5th moult there were several days during which little food was taken and some of the larvæ died, they appearing to be affected by the wet weather. I should say further that the notes as to time of moult were taken from a few of the more healthy larvæ, several of them being more protracted in their time than the one given. The 13 brought through all their stages had periods as follows:

1	a period of	52	days.	2	a period of	55	days.
2	"	56	"	1	"	57	"
1	"	59	"	1	"	60	"
2	"	61	"	1	"	62	"
1	"	65	"	1	"	70	"

The eggs were deposited April 30th, and the first moth hatched June 21st, the last July 10th. During former years I have found the larvæ of this species on willow and other bushes, and had them spin up the last of September and come out as moths the fore part of November. In other instances they passed the winter as chrysalids. From all the data given I should judge that there are from two to three broods during a season, according as the eggs are deposited by the early or late moths. All that I have wintered over hibernated in the pupa state, which is probably the usual if not the only method of hibernation.

On page 89 of vol. 9 of the CANADIAN ENTOMOLOGIST (1877) Mr. A. R. Grote mentions Mr. Hill, of Albany, N. Y., as authority for a statement that *Edusa* and *Lunata* are possibly sexes of one species. On page 174 of the same volume, Mr. Thomas E. Bean, of Galena, Ill., gives the result of some observations on specimens in his collection going to show that not only the two referred to, but *Saundersii*, should be included as well in

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one species, those having white on the wings the males, and *Lunata* the female. On page 228 of the same volume, Mr. Bean again refers to the same subject, giving some additional evidence from observation of the imagines, going to show the correctness of the position taken. Since that time many have regarded the question as settled, though I find in the Check List recently published by the Brooklyn Entomological Society, the three names stand as three species, with *Nigricans* between *Saundersii* and *Lunata.*

The result of my rearing fully confirms all Mr. Bean claimed, as the following will show. From the one brood of eggs deposited by a single moth, form *Lunata*, *Lunata*, *Saundersii* and *Edusa* were obtained, and the forms were hatched in the following order: Numbers 1, 3, 9, 12 and 13 were *Lunata;* Nos. 2, 5, 6, 7 and 10 were *Edusa;* Nos. 4, 8 and 11 were *Saundersii.* As an evidence of sex the frenulum was examined in each specimen, and in all the *Lunata* it was double, but single in both the other forms.

This settles the question beyond any doubt, and reduces two of the forms to sexual varieties. I have not the works containing the original descriptions by me, and can not say for that reason which name has the priority, but shall leave that question to some one who has access to these works.

Knowing this species to be a general feeder from having reared it on maple and willow before, no effort was made to test its range of food plants, but it was fed most of the time on plum leaves.

ON A RECENT SPECULATION AS TO RANK IN INSECTA.

BY A. R. GROTE.

The reader will have noticed, in the June number of the CANADIAN ENTOMOLOGIST, a paper on the "Physiological Arrangement of Insects." The author there places the *Orthoptera* first in this list, owing to the presence of auditory organs and well developed eyes. The "arrangement" which follows is exceedingly "mixed," but the object of the present remarks is to point out that the author mistakes when he considers the presence of sense-organs as the crucial test of rank. And for this

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reason, that, within the different Sub-orders, there is great variation in this respect. For instance, in the *Pyralidæ* we have forms almost identical, such as *Chryseudenton* and *Cataclysta*, which differ by the absence or presence of simple eyes. I do not wish to follow out the argument at length; the environment seems to effect comparatively easily the sense organs; Cave-insects are frequently blind. Again the Challenger Expedition brought up from the depths an eyeless Crustacean—*Willemoesia*, named for the distinguished naturalist, Dr. Willemoes-Suhm, who, unfortunately for science, died before the "Challenger" returned to her English dock. But insects *are* now "arranged" by their physiological characters, though certainly with very different results from those attained by Mr. A. H. Swinton. The whole structure and proportionate parts are taken into consideration, and little can be said against the observations, partly original, brought together by Dr. Packard in his "Guide." And Mr. Swinton himself speaks of Dr. Scudder's observations of rank in the Butterflies, not based on "sense organs," and which seems to us so full and satisfactory. The observations on the "Ghost-moth" are an echo of Dr. Packard's remarkable paper, in which the resemblance of *Hepialus* to the Neuropterous genus *Polystichoetes* was fully discussed. That the *Bombycidæ* afford instances of synthesis has been shown by this distinguished pupil of the elder Agassiz, who had so remarkable an ability for perceiving and weighing analogies and affinities in animals. The question of rank in insects goes hand in hand with that of the origin of the diverse forms. We fear that Mr. Swinton has but very partially examined the subject and that his suggestions as to sense-organs are not based on proper physiological studies. Not without a certain shudder can we read the author's glib disposal of the question of rank in *Hexapoda*. And his use of sense organs to determine rank is open to the objection that it is not thorough; that some members of his highest groups will fall into the lowest, and thus utterly forsake their "physiological associates" by reason of a sudden failing of ears and eyes. "As far as I can learn" is hardly to be expected as the basis of observations seriously advanced; yet with these words our author disposes of "the species of Hymenoptera, Neuroptera and Diptera." There is only one way to accumulate facts upon this subject, and that is to trace the changes in related forms, to take the dissecting needle in hand and to take down the numerous memoirs already extant upon the subject and thoroughly master their contents.

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THIRTY-FIRST MEETING,

To be Held at Montreal, Canada, August, 1882.

The Thirty-first Meeting of the Association will be held at Montreal, Canada, commencing at 10 o'clock, a. m., on Wednesday, the 23rd of August, 1882; under the presidency of J. W. Dawson, LL. D., F. R. S., Principal of McGill University, Montreal.

The headquarters of the Association will be at McGill University, where members will register as soon as possible after arrival. The hotel headquarters will be at the Windsor.

The offices of the Local Committee and of the Permanent Secretary will be at the University. The General Sessions and the meetings of the Sections and Committees will all be held in the University buildings. The particular rooms will be designated on the programme for Wednesday.

Members expecting to attend the meeting are particularly requested to notify the Local Secretaries at the earliest moment possible.

The address of the Permanent Secretary will be Salem, Mass., until August 17th; after that time and until the meeting has adjourned, his address will be Windsor Hotel, Montreal, Canada.

OFFICERS OF THE MONTREAL MEETING.

President—J. W. Dawson, of Montreal.

Vice-Presidents:

A. Mathematics and Astronomy—Wm. Harkness, of Washington.
B. Physics—T. C. Mendenhall, of Columbus.
C. Chemistry—H. C. Bolton, of Hartford.
D. Mechanical Science—W. P. Trowbridge, of New Haven.
E. Geology and Geography—E. T. Cox, of San Francisco.
F. Biology—W. H. Dall, of Washington.
G. Histology and Microscopy—A. H. Tuttle, of Columbus.
H. Anthropology—Daniel Wilson, of Toronto.
I. Economic Science, and Statistics—E. B. Elliott, of Washington.

Permanent Secretary—F. W. Putnam, of Cambridge.

General Secretary—William Saunders, of London, Ontario.

Assistant General Secretary—J. R. Eastman, of Washington.

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Secretaries of the Sections:

A. Mathematics and Astronomy—H. T. Eddy, of Cincinnati.
B. Physics—Chas. S. Hastings, of Baltimore.
C. Chemistry—Alfred Springer, of Cincinnati.
D. Mechanical Science—Chas. B. Dudley, of Altoona.
E. Geology and Geography—C. E. Dutton, of Washington.
F. Biology—Charles S. Minot, of Boston.
G. Histology and Microscopy—Robert Brown, jr., of Cincinnati.
H. Anthropology—Otis T. Mason, of Washington.
I. Economic Science, and Statistics—F. B. Hough, of Lowville.

Treasurer—William S. Vaux, of Philadelphia.

The Annual Meeting of the Society for the Promotion of Agricultural Science will be held at the rooms of the Natural History Society, Montreal, on August 21st and 22nd. The American Forestry Congress will be held at the same time in Forestry Chambers, opposite St. Lawrence Hall.

OUR ANNUAL MEETING.

By the kind permission of the Hon. S. C. Wood, the Commissioner of Agriculture for the Province of Ontario, the Annual Meeting of the Entomological Society of the Province of Ontario will be held at Montreal during the first week of the meeting of the American Association for the Advancement of Science. The meeting will be held at the rooms of the Montreal Natural History Society, on Thursday afternoon, August 24, at 3 o'clock. It is expected that there will be a large attendance of those interested in Entomology.

A meeting of the Council of the Society will be held on Thursday morning at eleven o'clock, at the residence of the Vice-President of the Society, Mr. J. G. Bowles.

CORRESPONDENCE.

DROSOPHILA AMPELOPHILA.

DEAR SIR,—

In a letter recently received from Mr. S. W. Williston, of New Haven, Ct., he says, in relation to the above insect: "I would call your attention

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to the 'two branched bristles' of the head. You will find that they are inserted in the third (last) joint of the antennæ, and correspond to the 'plumose arista' of the common house-fly, for example. They are found in all our species of Drosophilidæ."

G. J. BOWLES.

DROSOPHILA AMPELOPHILA, LOEW.

DEAR SIR,—

In the autumn of 1879 I bred and recognized numerous specimens of *Drosophila ampelophila*, Lw., at New Haven, from decaying pears, labelled specimens bearing date of Oct. 30. Since then I have observed them in August, September and October in the greatest abundance in Massachusetts and Connecticut. Perfectly sound fruit I have never known to be attacked by them, but the slightest indication of fermentation attracts them in great numbers, and about heaps of cider refuse I have seen them in clouds. Species of the family may be easily mistaken for one another, but by aid of Mr. Bowles' accurate figure of the wing, and by the presence in the male, on the tips of the anterior metatarsi above, of a minute but conspicuous black tubercle, the present Fermenting Fruit Fly may be with certainty distinguished. Loew apparently had some knowledge of its habits in giving it the name *ampelos*. As regards its distribution he says (Cent. II., 99): "*Drosophila ampelophila* in Europae regionibus meridianis frequentissima nec Europae mediae plane aliena etiam in meridianis Africae partibus habitat." The question is an interesting one: In which continent is it a native? The European *D. confusa*, as well as *cellaris* and *aceti*, appears to have very similar habits; doubtless other of our American species will be found to infest fruit.

S. W. WILLISTON.

New Haven, 28th July, 1882.

LARVÆ OF PAPILIO THOAS.

DEAR SIR,—

For several years past I have seen a few specimens of *Papilio thoas* in this locality, in the month of August, but in poor condition; this year they appeared as early as the middle of June. I have just found for the first time the larvæ in my garden feeding on *Dictamnus fraxinella*. There are two broods—one quite small, and the other three quarters grown.

G. H. VAN WAGENEN.

Rye, Westchester Co., N. Y., July 17th, 1882.

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ON CAPIS, GROTE.

DEAR SIR,—

Mr. Grote's reply to my remarks on *Capis* contains a statement which requires correction. He says: "Every student ought to know that in the Deltoids the eyes are always naked, the tibiæ unarmed." The latter part of the sentence is correct, but as a very fair proportion of the *Deltoidæ* have lashed eyes—Mr. Grote, himself, having described three genera with that character—the remainder of it is rather new and surprising, and contains information which all students are excusable for not having previously known. Generic descriptions should always be complete. *Capis* is said to be like *Sisyrhypena;* that genus is described as *Crambiform.* Before it is possible to know what *Capis* is like, we must go through *Sisyrhypena*, hunt up what *Crambiform* is, and graft on that the difference between *Capis* and *Sisyrhypena!* I do not consider my "Remarks on *Capis*" answered by Mr. Grote's reply. I am obliged to Mr. Grote for his offers of assistance.

JOHN B. SMITH.

BOOK NOTICES.

The Hessian Fly—Its ravages, habits, enemies and means of preventing its increase, by A. S. Packard, jr., M. D.; being Bulletin No. 4 of the Department of the Interior, U. S. Entomological Commission, 8vo., pp. 43, illustrated by two plates containing many figures, one woodcut and a map: being a synopsis of all that has been published in reference to this destructive insect, with such additional facts as the members of the Commission have been able to collect.

A Treatise on the Insects Jnjurious to Fruit and Fruit Trees in California. By Matthew Cooke, chief executive Horticultural officer; 8vo., pp. 72.

This useful pamphlet treats of the Codlin Moth, which has now taken up its permanent residence in California, making apple and pear growing in some sections very uncertain; the Pear Slug, the Red Spider, the Tent

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Caterpillar, Currant Borer, and several species of Scale Insects which attack the apple, pear, peach, plum, orange, etc., illustrated by a number of wood-cuts. It appears that our California friends are now seriously affected by insect pests, from most of which they had until of late been free. The fruit interests of this State are so highly important that very active measures are being taken to keep these insect pests within bounds, and an Act has been passed by the State compelling the general adoption of such remedial measures as shall from time to time be found of value. We shall watch with interest the effect of such legislation, and sincerely hope that it may result in a marked abatement of the evils complained of.

Revised Check List of North American Birds, with a Dictionary of the Etymology, Orthography and Orthoepy of the Scientific Names. By Dr. Elliot Coues; lge. 8vo. Estes & Lauriat, Boston.

Such a book from such a pen cannot fail to come into the hands of a great many Ornithologists, and the circulation of so valuable a work will greatly tend to render this much neglected part of the science more widely studied and understood. The first part of the book is devoted to notes and general explanations on Etymology, Orthography and Orthoepy. The second part contains the Revised Check List proper, and on the latter part of each page the names divided into syllables and marked for pronunciation and accentuation, with copious notes on the derivation. In regard to the nomenclature, the author has in many instances in this work taken a stand opposed to that of some eminent Ornithologists of the present day, which is much to be regretted in view of the desirability of uniformity in this matter.

The printing is excellent and done on fine heavy paper, and the proofs have evidently been most carefully read, altogether forming a very attractive volume and a valuable addition to the Ornithologist's library. —W. E. S.

ERRATA.—In our last issue, page 120, on 2nd, 11th and 12th lines, for "*Serion*" read *Sinon*.

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The Canadian Entomologist.

VOL. XIV. LONDON, ONT., AUGUST, 1882. No. 8

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting was held in the rooms of the Natural History Society, Montreal, on Thursday, August 24, 1882, at 3 o'clock, p. m.

The President, Mr. Wm. Saunders, of London, Ont., in the chair.

Present: H. F. Bassett, Waterbury, Conn.; Rev. C. J. S. Bethune, M. A., Port Hope; G. J. Bowles, Vice-President, Montreal; F. B. Caulfield, Montreal; Prof. J. H. Comstock, Cornell University, Ithaca, N. Y.; Prof. A. J. Cook, Agric. College, Lansing, Mich.; Wm. Couper, Montreal; T. Craig, Montreal; J. M. Denton, London; C. R. Dodge, Washington, D. C.; Prof. C. H. Fernald, State Coll., Orono, Maine; C. Fish, Brunswick, Maine; Jas. Fletcher, Ottawa; Rev. F. W. Fyles, Cowansville, P. Q.; Prof. H. A. Hagen, Mus. Comp. Zool., Cambridge, Mass.; W. H. Harrington, Ottawa; Prof. S. Henshaw, Boston, Mass.; Dr. P. R. Hoy, Racine, Wis.; J. G. Jack, Chateauguay Basin, P. Q.; Dr. H. S. Jewett, Dayton, Ohio; Prof. J. A. Lintner, State Entomologist, Albany, N. Y.; H. H. Lyman, Montreal; B. Pickman Mann, Assist. Entomologist Agricul. Dept., Washington, D. C.; Prof. C. V. Riley, Entomologist Ag. Dept., Washington, D. C.; Wm. Shaw, Montreal; E. D. Winble, Montreal; C. D. Zimmerman, Buffalo, N. Y.; E. Baynes Reed, Sec.-Treas., London, and others.

The minutes of the previous meeting were confirmed, the reading being dispensed with as they had been printed and sent to the members.

The President then addressed a few words of cordial welcome to the members present.

The report of the Council and the financial statement of the Sec.-Treas. for the past year were then read, and on motion, adopted.

The report of the Montreal Branch was submitted and read to the meeting.

The election of officers then took place, when the following gentlemen were duly elected:

President—Wm. Saunders, London.

Vice-President—G. J. Bowles, Montreal.

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Secretary-Treasurer and Librarian—E. Baynes Reed, London.

Council—Rev. C. J. S. Bethune, Port Hope; J. Fletcher, Ottawa; Rev. F. W. Fyles, Cowansville; W. Couper, Montreal; J. M. Denton, London; J. Alston Moffatt, Hamilton; W. H. Harrington, Ottawa.

Editor of Canadian Entomologist—Wm. Saunders.

Editing Committee—Rev. C. J. S. Bethune, J. M. Denton, E. B. Reed.

Auditors—H. B. Bock and C. Chapman, London.

The President then delivered his annual address, for which he was unanimously tendered a vote of thanks, accompanied with a request to publish it in the CANADIAN ENTOMOLOGIST.

ADDRESS OF THE PRESIDENT.

GENTLEMEN,—For the first time in the history of our Society, we meet within the limits of the Province of Quebec. Although belonging to Ontario, and sustained in our work mainly by the liberal aid granted us by the Government of Ontario, our sphere of usefulness extends throughout the length and breadth of this great Dominion, and also across the lines into the United States. We have long had an active branch of our Society in Montreal, comprising members who have materially aided in the advancement of Entomological science, and now at this particular juncture, when so large a body of distinguished scientists were to honor Montreal with their presence, and among them many noted Entomologists, no time, it was thought, could be more opportune than this in which to hold the annual meeting of our Society, and by the kind permission of the Hon. S. C. Wood, Commissioner of Agriculture for the Province of Ontario, we are privileged to meet here on this occasion.

During the past season that dreaded pest, the Hessian Fly, has prevailed to a considerable extent in Ontario. My attention was first called to it this season during the last week in July, when the grain was ripening. On visiting wheat fields in the vicinity of London, I found the insect very prevalent, and in some instances I believe the injury to the crop must have been fully twenty per cent. The affected stalks were lying on the ground, and the grain in the heads imperfectly developed; on pulling these they would often break at the point where the insect had been at work, that is, about the base of the first or second joint. On examining the affected stalks, the insect was found to be in what is known as the

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puparium or flax-seed state, from the resemblance which it bears in this condition to a grain of flax-seed. The attention of farmers was drawn to the depredations of the insect by a communication to the press, and information sought as to the extent of the evil. From letters received from various sections of the Province, it is evident that the insect prevails over an extended area, and that the sum total of the loss entailed on the agricultural community in Ontario from this cause would figure up to a large sum, probably hundreds of thousands of dollars. In 1876 and 1877 this insect appeared in considerable force and seriously injured the wheat crop in many parts of our Province, but since that time we have enjoyed comparative immunity from it until now.

The Hessian Fly belongs to the order of Diptera, or two-winged insects, and is about one tenth of an inch long, with dusky transparent wings fringed with fine hairs. There are two broods during the year. The flies which appear in the autumn deposit their eggs from one to twenty or more on a plant in the cavities between the ridges of the blades or between the stalk and sheathing base near the roots of the young fall wheat. These hatch in four or five days into tiny grubs, soft, smooth and shining, which work their way down the leaf to the base of the sheath, about the crown of the root. Here they fasten themselves head downwards to the tender stalk, live upon the sap and gradually become imbedded more or less in the substance of the stalk. When once located the larva moves no more, but growing rapidly, soon becomes plump, and when mature is about one sixth of an inch long, greenish, and semi-transparent; before long it changes to the flax-seed state, in which condition it remains throughout the winter. Early in spring the flies are produced, which deposit their eggs about the first or second joint of the stalk, where they pass through their several stages, assuming the flax-seed state a few weeks before the wheat ripens, from which the flies hatch in August and September.

The effect of the presence of this insect in the young fall wheat is to weaken the plants, which become unhealthy, turn yellow and sometimes die. Often there is a gall-like swelling or enlargement of the stalk near the base, in and about which the insects will be found. The unhealthy plants contrast strongly with the rich green of the vigorous uninjured grain. The late brood may be easily found by separating the leaf from the stalk of the young wheat in October or November; the early brood, as already stated, in the reclining stalks, which, when very numerous, makes the wheat appear as if "lodged" in patches.

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Various measures have been recommended for the destruction of this insect. Some have advised the immediate threshing of the wheat and the burning of the straw, but since most of the insects are left in the stubble this would be labor lost. Tearing up the stubble with a cultivator immediately after harvest, and raking it into heaps and burning it, is another suggestion, but this involves much labor at a time when the farmer is extremely busy, and during the process many of the insects would necessarily be shaken out of the stalks and escape. Burning the stubble in the field where practicable is a much wiser course, but it must be borne in mind that this process involves the destruction of the friendly parasites which feed upon the enemy, as well as the enemy itself. In my address to you two years ago, I expressed the opinion that we were almost wholly indebted for such immunity as we enjoy from destructive insects to the insect parasites which destroy them; subsequent experience has confirmed this view, and any measure which involves the destruction of these useful friends should be adopted with caution. I am happy to state that from specimens reared within the past few days, I find that a large proportion of the Hessian Fly is being destroyed by parasites this season. Late sowing has been much recommended, and the results seem to prove that on the whole this is the most practicable remedy—to defer sowing until about the 20th of September, by which time most of the flies will have disappeared; late sowing, however, has the disadvantage that the plants not being so well established, are not as well fitted to withstand the severe weather of the winter. High culture is advantageous, as the luxuriant growth which the young wheat makes under such circumstances will enable it better to withstand the weakening effects of the grubs. Among the other measures recommended are pasturing the wheat fields with sheep, and the application of lime to the young wheat to kill the larvæ.

During the past few weeks I have examined the roots of a number of sickly-looking grape vines about London, Ontario, and have found the root-inhabiting form of the *Phylloxera vastatrix*, the dreaded scourge of the vine in Europe, in considerable numbers on the young rootlets, and have been able to clearly trace the diseased condition of those vines to that cause. I am convinced that this insect prevails to a greater extent than may at first be suspected throughout our Province, and that it is inflicting material injury, for besides having found it common about London, I have satisfactory evidence of its presence in the neighborhood of Grimsby, where many vines are reported as diseased, and have also

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found it recently injuring the vines at Paris. There are no symptoms which indicate the first onset of this insect; it is only after the Phylloxera has destroyed a large portion of the roots, that the vine assumes a sickly aspect, becoming stunted in its growth and yellow in the foliage. On examining the roots of a vine so affected, most of the small rootlets—through which the vine draws the chief part of its nourishment—are found dead and with many small knots and swellings on them. If a few freshly formed, living rootlets can be found, which may in such cases be looked for about the crown of the vine, these minute lice will usually be seen clustering upon them, often surrounded by groups of their eggs, and causing little swellings thereon; but it frequently happens that when the vines have reached this depleted condition, no insects can be found; they have entirely left them, and traversing the interlacing roots of other vines, found their way to richer pastures.

This insect occurs in two very different forms; in one, known as the gall-inhabiting type, it is found upon the vine leaves, producing in June, July and August globular or cup-shaped galls of varying sizes, of a greenish red or yellowish color, with their outer surface uneven and somewhat woolly. The enlargement is on the under side of the leaf, and if one is cut into, it will be found to contain from one to four orange colored, wingless lice, and a large number of very minute, oval, pale yellow eggs, with some newly hatched lice. Soon the gall becomes too thickly populated, when the surplus lice wander off through its partly opened mouth on the upper side of the leaf, and establish themselves on the same leaf or on adjoining younger leaves, where the irritation occasioned by their punctures causes the formation of new galls, within which the lice mature and increase. These galls are quite common, especially on leaves of the Clinton and other thin-leaved varieties, also on the wild grape; they sometimes occur in such abundance as to cause the leaves to turn brown and fall prematurely from the vine, and instances are recorded of defoliation from this cause. Late in the season, as the leaves become less succulent, the lice either perish or seek other quarters, and some of them find their way to the roots of the vines and establish themselves as already described, where, with their change of habit, there follows a slight difference in their appearance. During the winter they remain torpid, renewing their activity in spring. As the summer advances, a portion of the root lice acquire wings, when they issue from the ground, and rising in the air, they fly or are carried with the wind to neighboring vineyards, where they

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deposit eggs on the under side of the leaves, among their downy hairs, beneath the loosened bark of the branches and trunk, or in crevices of the ground about the base of the vine. The complete life history of this insect, which is extremely interesting and curious, may be found in the 5th, 6th, 7th and 8th Reports on the Insects of Missouri, by Prof. C. V. Riley.

The gall-inhabiting type of this insect may be subdued by picking off the infested leaves and destroying them, but the root-inhabiting type is a much more difficult form to deal with. Various applications to the soil have been recommended, such as bisulphide of carbon, and carbolic acid diluted with water and poured into holes made in the soil about the roots; soot, lime and ashes have also been suggested, strewed around the vines.

Several species of predaceous insects prey on this louse. The larva of a small fly, an undetermined species of *Diplosis*, deposits its eggs within the gall, in which the larval and pupal stages are also passed. The larva of this friendly species, although destitute of legs, is very active, and groping about within the hollow of the gall, seizes on the young lice as hatched and sucks them dry. I have found no evidence of its attacking the parent lice, the newly born and tender progeny being more to its taste, and in sufficient abundance to furnish it with a constant supply of fresh food. In some instances one larva, in others two are found in a single gall, but in no instance have I found living lice with the chrysalids, an evidence that its beneficial work is completed before this change takes place. An active mite, *Tyroglyphus phylloxera*, the larva of a Syrphus fly, *Pipiza radicans*, also the larva of a small dull-colored Lady-bird, a species of *Scymnus*, all aid in keeping in subjection the root-inhabiting form.

Most of our American vines are much more vigorous than the European sorts, and hence are likely to endure the inroads of this insect much better. As the insect is native to our country, our vines must have always been subject more or less to its attacks, and hence probably have developed a hardier constitution, with greater capacity for endurance or resistance. Last year I observed on some Concord vines evidences of unhealthiness, which I now believe arose from the presence of Phylloxera; this season most of them seem to have recovered their natural vigor. This inspires the hope that our vines may be able to endure the presence of this pest without very serious injury or loss.

During the month of July I received from Prof. J. A. Lintner, State

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Entomologist of New York, specimens of parasitized eggs of the Gooseberry Sawfly, *Nematus ventricosus*, which he kindly sent me for the purpose of enabling me to introduce the parasite into Canada. This parasite is a very minute four-winged fly, probably *Trichogamma pretiosa*, with very delicate fringed wings. Some of these I placed while still unhatched near to eggs of the Sawfly recently laid on currant leaves. It is sincerely hoped that the effort for their introduction into Ontario will be successful, as they seem to do their work very thoroughly, every egg in the examples sent me being parasitized. The presence of the parasite may be detected by the discoloration of the egg, which becomes brown.

Recently I have received from a correspondent in Oakville, Mr. M. Felan, some examples of the destructive work of *Systena frontalis* on grape vine leaves. This beetle, although very generally distributed, has not, as far as I know, ever been recorded before as destructive or noxious. In this instance it seems to be quite local in its abundance, as my correspondent informs me that they are not found on his neighbor's vines, although very abundant and destructive on his own, eating the green tissues of the leaf on the upper side and causing it to wither.

Examples of what appears to be a new disease on the pea have lately been brought to my notice from several localities, under the impression that it was caused by an insect. The disease manifests itself in a series of white fleshy swellings at short intervals along the fibrous roots, varying in size from one-sixteenth of an inch to one-eighth of an inch or more in diameter, irregular in form, and of a solid fleshy structure. Microscopical examination has convinced me that it is a fungus growth in the production of which insects play no part. It appears to have the effect of stunting the growth of the plants and lessening the crop.

The short fruit crop this year, after the abundant promise of the spring, has been by many attributed to the work of insects, but this I am satisfied is an error, for while in many instances a small amount of injury has been done by insects, the main causes of the failure must be looked for elsewhere. Insects are important agents in the fertilization of fruit blossoms, and at the time of the abundant blossoming of the past season wet weather prevailed with an unusually low temperature, which prevented the insects then on the wing from visiting the flowers; the low prevailing temperature may have also interfered with the proper maturing of the fertilizing agent, while the frequent rains washed away from the opening

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flowers much of the pollen as formed. To these causes combined may probably be attributed the lack of fertilization of the blossoms. Following this unfavorable weather, and doubtless induced and fostered by it, a species of minute fungus attacked the leaves, extending over a large portion of their surface, and often down the leaf-stalk to their base, causing a dark brown discoloration. This same fungus attacked the young fruit also, deforming a considerable proportion of the few specimens which were to be found, and these attacks resulted in a withering and curling of the leaves; the young fruit became stunted and deformed, and in many instances much of the foliage dropped to the ground. The effect of this injury, even at this advanced period in the season, is still to be seen in the sparseness of the foliage on many of the trees, in the discoloration of the leaves and the stunted growth of the branches.

It is difficult to anticipate with any certainty the effect of this disease on the fruit crop of next year, but since as a rule any interruption to the healthy growth of a tree leads to the more abundant production of fruit buds, it is probable that with a favorable season, we may have a very abundant yield in 1883.

California has for some years past been shipping fruits from her abundant surplus to all parts of the continent, and her favored climate furnished conditions under which pears, apples, plums and grapes prospered to an extent unknown elsewhere, and for many years almost free from the insect pests which in other fruit-growing regions levy so heavy a tax on the growers. But this exemption could not be expected to be permanent. The Codlin Moth made its appearance there in 1874, and ever since then has been increasing to an alarming extent, the climate favoring its propagation with a rapidity unknown in less favored districts, so that there are three, and in some instances four broods in a season. They attack the pears and quinces, as well as the apples, and destroy and disfigure a large quantity of fruit. California fruit growers are also suffering from the Phylloxera, Pear-tree Slug, Red Spider, Tussock Moth Caterpillar, the Currant Borer, a native Tent Caterpillar, *Clisiocampa constricta*, and a number of species of bark lice or scale insects, which attack apple, pear, peach, plum, orange, lemon, fig and olive trees, being found alike on the bark, foliage and fruit, and which multiply with amazing rapidity. Recognizing the vast importance of the fruit crop to the State, the most stringent measures are being enacted for the purpose of subduing these pests. An

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Act was passed by the State Legislature in March, 1881, in the interests of horticulture and viticulture, providing for the appointment of a State Board of Commissioners, one from each of the large fruit-growing districts, with almost unlimited powers to restrain, seize, or prohibit the importation of anything and everything likely to aid in distributing these insect pests—any suspected vines, vine cuttings, trees, empty fruit boxes or other material likely to spread insects or contagion, and any willful violation of the quarantine regulations of this Board is considered a misdemeanor and punishable with a fine of from $25 to $100. These Commissioners are also charged with the duty of preparing rules to be observed by fruit growers for the extermination of insects, and suitable powers are given them to enforce the carrying out of these rules. In reference to the Codlin Moth, every apple grower is compelled to scrape the rough bark off his apple trees every spring, to collect and burn the scrapings, and apply, after scraping, an alkaline wash—the constituent parts of which are specified—to the tree. All boxes in which apples, pears or quinces have been stored or shipped are required to be dipped in boiling water containing a pound of commercial potash to each 25 gallons, for at least two minutes. These measures look to the destruction of the pupa. But, further, bands of cloth or paper of a specified width must be fastened around each apple, pear and quince tree, before the fifteenth day of May in each year, and examined every seventh day afterwards throughout the season, and all larvæ or pupæ destroyed. Precautionary and remedial measures are being enforced in reference to many other destructive insects, and any laxity or omission on the part of fruit growers in carrying out the instructions of the Commissioners is punishable by fine. The chief officer of the Commission is required to visit, examine and report upon the fruit growing interests in the various sections of the State, appoint resident inspectors for each county to enforce the regulations adopted by the Commission, and to experiment on the best methods of subduing insects and diseases destructive to fruits, and disseminate the information so obtained. For the carrying out of these objects an appropriation is made by the State of ten thousand dollars a year.

Those interested in Economic Entomology will, I am sure, watch with much interest the effect of such vigorous legislation, and if measures of this character can be successfully enforced there, why not elsewhere? There seems to be a necessity for the general adoption of some stringent measures which would prevent the careless and lazy from making their

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grounds the breeding places of noxious insects which prey upon and destroy the crops of their more thrifty neighbors.

I have the honor to be,

Yours very sincerely,

WM. SAUNDERS.

There being no further business, the meeting of the Entomological Society of Ontario was then adjourned.

The meeting then resolved itself into an informal gathering of the Entomological members of the American Association for the Advancement of Science, then in session in the city of Montreal.

On motion, Mr. W. Saunders and Mr. E. B. Reed were requested to act as Chairman and Secretary respectively of the meeting.

Some discussion took place respecting the Entomological Club of the A. A. A. S., when it was moved by Dr. Hagen and seconded and duly carried :

Resolved,—That Prof. J. A. Lintner be requested to take the necessary steps to call further meetings of the Entomologists present at this session of the Association, at such times and places as might be determined on, and also to provide for similar meetings for Entomological discussions at the future annual gatherings of the Association.

PEA FUNGUS.

Mr. Geo. McCloskie, of Princeton, N. J., asked for some information about a peculiar fungus-like growth on pea roots, referred to in Mr. Saunders' address. The Chairman gave it as his opinion that it was a fungus.

Samples were shown exhibiting the pea as affected by this disease.

COTTON WORMS.

Mr. Jas. Fletcher asked if there was any further information respecting the habits of the Cotton Worm Moth, *Aletia argillacea*, he believing that from its frequent occurrence in Ontario in such a perfect condition, it must breed in Canada ; he was aware that the larva had never been found here and that Prof. Riley had in his able paper on this moth, expressed his conviction that the moth did not breed in Canada.

Prof. Riley stated that so far as he knew from repeated observations and experiments, the cotton plant, *Gossypium*, was the only food plant of this insect ; he thought that the peculiar formation of close-fitting scales

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of the wings would account for the apparently fresh condition of the moths found in Ontario, and he believed that the insect possessed ample powers to fly such a distance as that from the Southern States to Canada. There might be a probability that the insect bred in the Northern States, but he was still of the opinion that the moth was a purely Southern species.

Dr. Hoy stated that he had found in Wisconsin a specimen of the moth at the end of August, with the fore and hind wing on one side of the body in a deformed and crippled state, evidently showing that it must have very recently emerged from the chrysalis. He also stated that a female moth had been captured near his residence about the middle of June. He thought the insect must breed in the North sometimes.

Prof. Comstock confirmed Dr. Hoy's statement as to the finding of the crippled moth, but thought, however, that the moth generally bred in the South.

Prof. Fernald said he had seen fresh specimens taken in Sept., in Maine.

The Chairman said that occasionally fresh moths and butterflies might be captured in entirely new localities, but that generally some probable reason could be given for their appearance; as, for instance, he remembered that many years ago two fresh specimens of *Argynnis columbia* had been found at St. Catharines, Ont., a place where they had never before or since been observed, but that they had probably found their way there among the large number of fruit and other trees imported from the States; still, however, no such probable reason had been suggested for the appearance of the Cotton Worm Moth in Ontario, in such frequent numbers and at so many different localities. The matter was one of great interest.

Mr. Fletcher said he hoped the members would continue their observations of this insect, the larva of which, if found in Canada, would probably feed on some *Malvaceous* plant.

(To be Continued.)

RE-PUBLICATION OF VOLUMES I. AND II.—In consequence of the demand from various European scientific societies and others for complete sets of the CANADIAN ENTOMOLOGIST, the Editing Committee have found it necessary to reprint the first and second volumes, which had been long out of print. The Society can now supply at the usual price copies of all the volumes, on application to the Sec.-Treas., Mr. E. Baynes Reed, London, Ont.

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DESCRIPTION OF A NEW SPECIES OF COPÆODES.

BY W. H. EDWARDS, COALBURGH, W. VA.

COPÆODES WRIGHTII.

Male.—Expands .9 inch.

Upper side yellow-ochre color; costal margin of primaries black on the edge, and hind margins of both wings edged black, scarcely more than a line; costal margin of secondaries broadly bordered black; the ends of the nervules on primaries edged black for a little distance; on the disk a black sexual narrow bar, broken into three parts, and crossing obliquely the lower median and submedian interspaces; fringes pale black shading into whitish.

Under side pale yellow-ochre of one shade; a little dusky near base of primaries, otherwise immaculate.

Female.—Expands 1.2 inch.

Color of male, the nervules not edged black; immaculate.

Under side as in the male.

From 4 ♂, 2 ♀, part of 18 examples taken in the Mohave Desert, So. California, July, 1882, by Mr. W. G. Wright.

Mr. Wright says: "I have made a four days' trip to reach the Mohave Desert. We went over a pass 6,000 feet high, in the higher portions of which I saw a few Chionobas? but took only three, as they were very skillful in getting into the thorn bushes. Next on the high dry plain, I took a ♀ Anthocharis, perhaps *Lanceolata*. Then it was perfectly dry and barren for 20 miles to Mohave River. About 60 rods from the river came a change in the vegetation, the whole ground being covered with a salt weed somewhat resembling eastern "hog weed," but more branched, and upon the flowers of that I saw these bright little yellow Copæodes. I instantly jumped out and told my companion to go on to the river, and then and there I collected 18 of them. More could have been got, but they were rather lively, and I thought I had enough, especially as I saw other things, one of which was a black species (Amblyscirtes *Libya*). Here also I took a few Pamphila *Sabuleti* and P. *Campestris*. In the desert I saw an orange butterfly" (probably *Terias*), "but could not take it. The flight of this was exceedingly rapid and erratic, and over bushes which rendered pursuit difficult or impossible. These orange

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butterflies were always several miles from water. When I went out I thought I should find a good many insects at the watering places, water being so scarce there, but on the contrary, I found few or none there. The springs or wells are 15 to 25 miles apart, and the intervening desert is absolutely dry and parched, yet in good part is covered with bushes of several kinds, cactus, etc., and also sometimes with a monstrous tree, the "Joshua," *Yucca brevifolia*, which looks as if it belonged to another world. No gnats, no mosquitoes, but few birds, no squirrels, very few snakes and those all rattlers, but plenty of sand and so hot! The sun beats down with vertical rays and the air is like that from a furnace. I saw no other butterfly at the river than I have mentioned, except one Danais, small, pale-colored, and it seemed to me differently marked from any I have seen at San Bernardino."

NOTES ON THE LARVA OF BUCCULATRIX AMBROSIÆFOLIELLA.

BY V. T. CHAMBERS, COVINGTON, KY.

This species was described by me in the Cincinnati Quarterly Journal of Science, v. 2, p. 119, and it was said to feed upon the leaves of *Ambrosia trifida*, in the larval stage. Afterwards, in a note in the American Entomologist, I suggested that as it had only been bred from a collection of leaves of that plant, and had not actually been seen feeding, and as some species of *Bucculatrix* sometimes crawl away from their food plants to pupate, it was possible that it might turn out that this larva did not feed upon Ambrosia. This summer, however, I have been fortunate enough to find the larva mining the leaves of *A. trifida*, and also of several varieties of *Helianthus;* indeed it is much more numerous on *Helianthus* than on *Ambrosia*. *Lithocolletis ambrosiæella* and *L. helianthivorella* feeding on the same plants, many would consider only varieties of one species; as also many would consider *Tischeria ambrosiæella* and *T. heliopsisella*, which feed on the same plants, and on *Heliopsis*, varieties of one species. It is a little singular that so many of these minute leaf-mining species should feed on so many varieties and species of *Helianthus* and *Heliopsis*, and all on the single species of *Ambrosia*, and on no other

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species of that genus, except that *Tischeria ambrosiæfoliella* feeds also on *Ambrosia artemisifolia*. *Butalis matutella* feeds on *A. trifida* and on Asters; but not, so far as is known, on any other species of *Ambrosia*, nor on *Helianthus* or *Heliopsis*. *A. trifida* seems to be a point from which they radiate, so to speak, to other *Compositæ*.

In the published description of *Bucculatrix ambrosiæfoliella* I find that I have omitted to mention the minute tuft of brown scales on the dorsal margin of the fore wings, and that in the sentence which reads, "the scales between the black internal edging of the arc, and the costal margin, are ochreous," the word "dorsal" should be substituted for "costal."

The larvæ of several species of *Bucculatrix* are known in Europe; but in this country, until now, Dr. Clemens' "mere mention" of the larva of *B. pomifoliella* Clem., is all that has been published. Briefly the larval habits of the genus may be thus summarized: The larva while very young mines in leaves, and leaving the mine, it feeds externally, moulting once in a little cocoonet, and again in a singular ribbed cocoon, where it passes the pupa stage. Dr. Clemens says truly that the larva of *B. pomifoliella* feeds on apple leaves, and pupates "in an elongate, dirty white, ribbed cocoon," but this, with a brief description of the larva in one of its stages, is about all of the information that he gives us about it. *B. pomifoliella* is not uncommon in this region (Kentucky), but I have never met with the larva, and until I met with the larva of *B. ambrosiæfoliella*, larvæ of this genus have been unknown to me.

I have elsewhere suggested that, owing to certain structural resemblances of the pupæ of *Bucculatrix* and *Lithocolletis*, it would be found, when the larva of *Bucculatrix* was dissected, that it belonged to the same larval group with *Lithocolletis*, *Gracillaria*, etc. In this group of larvæ the mouth parts are in the first stages very imperfect, the maxillæ, and both maxillary and labial palpi, are either entirely wanting or very rudimentary, and the other mouth organs are of very different form and structure from that of ordinary caterpillars. At some subsequent moult (first, third or fifth, as the case may be—varying in different genera and species of the group) this "ordinary" form is assumed, and I have therefore usually mentioned the imperfect form as the "first" form, and the other as the "second" or "ordinary" form. My suggestion as to *Bucculatrix* was that, where the mouth parts of the larva in its first stage were examined, it would be found to have mouth parts of the "first" form, because in its pupa state certain structures of the head and 2nd segment

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are similar to structures possessed by *Lithocolletis*, *Gracilaria*, and other genera, the larva of which in their early stages have mouth parts of the "first" form. A peculiarity of this "first" form is that, owing to the structure of the mouth parts, the larva possessing them can not feed down into the parenchyma like a larva having trophi of the "ordinary" form, but can only eat in the plane in which the larva lies, consuming a few of the cells of the parenchyma lying next to the cuticle, and leaving all beneath it uneaten; while a larva with the "ordinary" form eats out the whole parenchyma, or at least eats down into it. A glance at the mine of *B. ambrosiæfoliella* was therefore sufficient to show me that my suggestion as to the group to which *Bucculatrix* belongs was unfounded; the entire parenchyma was eaten out, and therefore the trophi were of the "second" form, and different from those of *Lithocolletis*, etc. On closer inspection, however, the earliest part of the mine did not appear to have all of the parenchyma eaten out. Still it did not have the appearance of a mine of a larva having the "first" form of trophi; the eaten portion did not all lie close to the cuticle, but the parenchyma was irregularly eaten into—sometimes eaten almost through—in a way that could not be done by a larva with the "first" form of trophi, but which might have been done by a very young and small larva with trophi of the "second" form, and dissection showed that this was the truth of the matter. The larva never has trophi of the "first" form in any stage.

But among larvæ having trophi of the "second" form, there are sub-groups, each of which presents important differences from the others in the structure of the different organs. Thus, so far as I have examined, all the larvæ of *Rhopalocera* have trophi differing in some respects from those of *Heterocera*, except that the larva of the Tineid, *Plutella cruciferarum*, has larval trophi resembling those of the Skippers. The Attacidæ again form a sub-group. All of the other *Heterocera* again, except some of the Tineids to be presently mentioned, form another sub-group. These "other Tineids" comprise *Cemiostoma*, which stands alone; *Tischeria*, which also stands alone in some respects, whilst in others it resembles *Bedellia*, *Antispila*, *Aspidisca* and some others which are more or less similar to them, though differing from them in some respects, and among these is *Nepticula*. All of these I class in a single sub-group of larvæ. The larval trophi of *Bucculatrix* more nearly resemble those of *Nepticula* than any of the others. Mr. Stainton (not mentioning the larval trophi) has already written of *Bucculatrix*: "This genus offers several points of

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resemblance with the next family." *(Nepticulidæ)*, "but the larvæ have six well-developed true legs."—Ins. Brit., v. 3, p. 290. The six legs seem to have been Mr. Stainton's chief, if not only reason, for excluding *Bucculatrix* from *Nepticulidæ*, in which the six true legs "are wanting, and they are replaced by membranous processes or prolegs, yet neither on these segments nor on the remaining segments, each of which is furnished with a pair of prolegs (making eighteen in all), have the prolegs the usual coronet of little hooks" (Ibid, p. 296). Dr. Clemens says of *B. pomifoliella* that the legs are "very small," and though this can not be said of *B. ambrosiæfoliella*, yet its anal prolegs are destitute of the coronet of little hooks, having only a single little spine; while the abdominal prolegs have each only these little claws, rather than the usual tubercles; so that I do not hesitate to place *Bucculatrix* in the same larval group with *Nepticula*. The thoracic feet have each a single claw which is set around with numerous, rather stiff, bristles, and, as hereafter shown, are used to guide the thread in spinning the cocoon. Each segment of the body is clothed with numerous hairs, especially the pro-thoracic segment, where the hairs are stiff and project forward over the head; this segment in the adult larva has twelve microscopic red-brown spots, ten of which are on the back—four of them in the angles of a square, three others obliquely on each side of the square, and one other, larger but more indistinct, on each side; these spots I think are hypodermal.

The egg, a minute colorless globule, is deposited on the upper surface of the leaf, and the larva, leaving it, makes at first a short, tortuous, linear mine, which ends in a small blotch with the frass in compact lines. The first stage lasts probably between three and four days (the youngest larva I have seen was a little more than one-fortieth of an inch long). The larva at this stage is sordid white. Having ceased to feed, it doubles itself in what Mr. Stainton calls horse-shoe shape, the ventral surface of the anterior half being applied to that of the posterior half of the body, and thus it undergoes its first moult in the mine. The larva, when it has cast its old skin, is no longer sordid white, but is striped longitudinally; there is a dorsal green stripe, margined on each side by a white line, beneath which is another green stripe on each side, containing on each segment two white spots placed obliquely, the lower spot being the largest, and the under surface is pale greenish; the larva frequently has a faint pink tinge, and the longitudinal stripes, which are very faint at first, become darker with age. It remains in the mine and feeds for about one day

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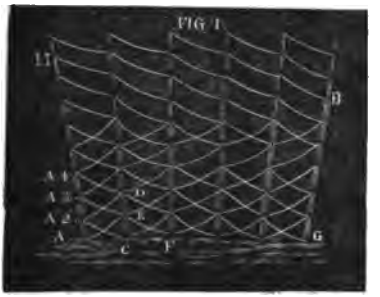
after its first moult; then leaves it, and feeds externally for about two days, usually on the under side of the leaf, but occasionally also on the upper side. There it spins beside a rib a thin sheet of white silk, beneath which it spins a cocoonet, in which it again assumes the horse-shoe shape, and passes in about a day to second moult. Emerging from its cocoonet, it continues to feed externally for three days, when either on the plant or near to it, it spins its ribbed cocoon, in which it passes the pupa state. I have not observed accurately the length of this stage; in August it is about a week. The mature larva is about three lines long.

I have frequently been puzzled to understand how the larva could spin this singular cocoon, but I have now fortunately been enabled to watch it at work under the microscope. The cocoon shows six longitudinal ribs or ridges, with depressions like valleys between them. Each rib consists of four threads, and is four times as thick as the depressions; the threads of the ribs are longitudinal and rigid, those of the valleys run obliquely transverse, and each is permitted to droop or sag down, and they are spun first from right to left, then from left to right, crossing each other at a somewhat acute angle, the one set being kept always about four threads in advance of the other, the finished portion of the cocoon showing the two threads crossing each other, while the unfinished shows only two threads without any thread crossing them, as shown in fig. 1 at *a* finished, at *b* unfinished, portion of the cocoon.



But properly speaking, this is no part of the cocoon, but only a reticulated frame or net-work, within and attached to which the true cocoon is spun. The whole net-work is a continuous thread, with no break; each transverse thread continues entirely across the cocoon, but the ribs are not continuous threads the length of the cocoon; each rib is made by a multitudinous succession of movements forward and back again, each movement only the length of the space between two transverse threads. Whenever in the transverse movement of the head, the apex of the spinneret touches a rib, it is moved forward and back again. Thus, the larva (having laid the floor or foundation of its reticulated frame-work by spinning its web somewhat densely over the portion of the leaf that is to

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be covered by it, and for some little distance around it) reaches at length, we will say, the point *a*, fig. 1, when it is ready to begin the reticulated work. Working backwards, the head is now drawn back and a little out to *a* 3; the claw of the fore foot is here applied to the thread (which has no elasticity, or very little, and which hardens the instant it is fairly out of the spinneret); the head is drawn back along the line towards *a*, as far as *a* 2, where it leaves the hardened thread, using the claw again, and passes obliquely down and forwards again to the foot of the second rib at *c*, where it is attached to the floor, and the thread again bent on the claw, is retracted a little upwards nearly parallel to the line *a* and *a* 3, to the point *d* in the figure, when, again bent on the claw, it is carried forward (adjoining the newly spun thread) to the point *e*, where it leaves the thread (just as it did at *a* 2), and passes obliquely forwards again to the foot of the third rib at *f*, and this is repeated until the spinneret arrives at the point *g* at the base of the other side of the cocoon. It is then carried along the floor of the cocoon back to the point *a* 2, then it is again retracted to the point *a* 4, where it is bent on the claw and advanced again to *a* 3. In retracting the head from *a* to *a* 3, a single thread is left; returning it to *a* 2 adds another thread along that part; from *a* 2 to *c* there is only a single thread; retracting it to *d* leaves a single thread of course, while advancing it to *e* leaves another that far, and the thread leaves the rib, being carried to *f*, as above stated. Thus the base or beginning of each rib (at *a* and *c*, etc.) would consist only of a single thread, but while the spinneret is there it is passed several times up and down that part, and the thread is thus strengthened, and sometimes while at work on the reticulated net, the larva, on reaching the floor, would pass its spinneret over it in various directions, advancing under it up to its very beginning, thickening the floor, and fastening the attachments of the ribs to it, and sometimes retiring and entirely leaving the net-work so far that I thought it had left it finally; but it always returned, and continued its work on the reticulated frame which, as before stated, forms at first only the outer covering of the true cocoon. Hitherto the larva has been building in front of, around and over its head, gradually retiring as the work advanced towards it; therefore to make a line in one of the ribs it would retract its head, while to double the line it would advance its head or spinneret. Each of the obliquely transverse lines was permitted to sag down between the ribs and was long enough to do so by its own weight. To make each line in a rib the head was retracted the distance between three transverse lines, and

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then, bending the thread, it was advanced over the space between two of these (that is, about one-hundredth of an inch) to the point where it leaves one rib to proceed to the next one.

But thus far we have each rib composed of only two threads and the transverse lines running in only one direction. How is it as to the other set of obliquely transverse lines which cross the first set? and how are the two additional threads added to each rib? All of this is done precisely as the first set was made. Returning from the side *g b* of the frame, the work is only a repetition in the opposite direction of the work first done as above related. Having finished about three-fourths of the frame, retreating from it and working towards itself, as above stated, the larva now passes up into it, adding to the floor and the foundations as it goes, till having reached the upper end, it doubles upon itself, and reverses its position, protruding about one-fourth of its body through the open end of the frame, which it now begins anew from the other end and repeats here the work already done, until the two portions almost touch. Then it ceases to follow the regular pattern of the reticulation, and by a series of longitudinal threads passed rapidly to and fro, connects the two pieces of the frame much as a tailor darns a rent in a garment, and this darn may be detected even in an old cocoon. The larva is now completely enclosed in the frame work, and immediately begins to spin its cocoon proper within it. This occupies only the central position, not extending into either end of the frame. It works very rapidly, and in three hours from the time that it begins to spin is entirely concealed from sight.

It is very interesting to watch the little architect at work upon its reticulated frame. It evidently understands its trade, whether we call it a house-builder or weaver. It knows exactly what it has to do, and how to do it, and "goes straight along" with its work with an air of as much conscious intelligence and understanding as any other builder of homes either with or without hands. It is difficult to watch its operations without feeling that here is a conscious intelligence at work. All other known species of the genus, save one, make these ribbed cocoons, and to do so they must work much as this one does. How the instinct to make a cocoon, and especially one like this, ever originated—what advantage in "the struggle for existence" the reticulated pattern possesses over a common one in which the threads are carried hither and thither apparently without order or plan—and why this instinct should be lacking in a single species, are questions as unanswerable as why some spiders are

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geometricians. I will only add that if the larva ceased to spin when the reticulated frame work is finished, the cocoon would belong to the same class with those of *Plutella cruciferarum* and a few others which pupate simply in an open network.

Fig. 1 is very imperfect. It should represent the transverse lines not only as oblique, but as sagging down more than they do, and should show more clearly that each, on reaching a rib, passes along it, over the space between these lines, and is bent back over the space between two. It is proper, perhaps, to state that the threads harden so quickly, or lose their viscidity so quickly, that two threads in contact seldom adhere except immediately at the point of the spinneret.

I will add that so far as I have examined bred specimens of the imago, those from *Ambrosia* have the markings more sharply defined and the brown scales darker than those from *Helianthus*.

GONILOBA *(Eudamus)* TITYRUS, Fab.—I have within the last few days of the end of August made a capture of numerous specimens of the larvæ of two skippers—hitherto, it has been considered, rather rare in this locality, only an occasional specimen of either larva or butterfly being seen.

On a few locust trees and young second-growth of *Robinia pseudacia*, adjoining my office, I took in about an hour some eighty specimens, and I am satisfied a very little exertion would have procured another hundred; on a subsequent search I also found them in another locality some distance off. The larvæ were nearly all three parts grown, and some just beginning to enter the pupal stage; in only one or two instances did I discover very young specimens. It is worthy of note that I only saw three specimens of the butterfly this summer, so that it could not have been very common. Dr. Harris says "that the viscid locust tree is sometimes almost completely stripped of its leaves by these insects, or presents only here and there the brown and withered remains of foliage which has served as a temporary shelter to the caterpillars." I could not see, however, that the larvæ had done any appreciable harm to the trees on which I found them, although their numbers would have led me to look for very material injury. I would state also that in some seven or eight instances in examining the empty leafy cases formed by the larvæ, I found single specimens of *Clytus pictus*, who seemed to enjoy the cool retreat thus provided for them from the heat of the sun.

E. BAYNES REED, London, Ont

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IS PAEDISCA SCUDDERIANA A GALL-MAKER?

BY D. S. KELLICOTT, BUFFALO, N. Y.

A gall from a Golden-rod, out of which a moth of this species has escaped, is figured in Second Report Insects of Missouri, page 134. In the accompanying description the author says: "There are some doubts in my mind as to whether it is a real gall-maker, or an inquiline, or an intruder on my true Solidago gall-maker *(Gelechia gallæsolidaginis)*." "My reasons for thinking this insect an intruder are, first, because if it were a true gall-maker, we should naturally expect to find its gall more common; second, because on several occasions I have found within the *Gelechia* galls a pale worm very different from the true gray gall-making larva." In the CAN. ENT., x., 202, I asserted, perhaps too abruptly, that this moth is not an intruder, but the cause of the gall in which it resides during the larval and pupal states. In the paper cited I gave my reasons for this conclusion, reasons which I considered sufficient, namely: that it was very abundant about Buffalo, that I had followed the larvæ in the galls from soon after hatching and soon after they had pierced the stem until final transformation, and that their gall habits were somewhat characteristic. In Bulletin No. 6 of the United States Entomological Commission, page 57, referring to this species (under the name *Euryptychia saligneana* Clem.), Mr. Riley says: "From comparison of female specimens I am led to believe that this is the same species that is commonly known in Europe as *Spilonota roborana* Schiff. . . . The insect in Europe is known to feed on the leaf-buds of the rose. I have abundant proof that in this country it is not a gall-maker, but as was inferred in the Report, an inquiline. I have found its larva feeding upon the flowers as well as amid the terminal leaves of the Golden-rod, and I have also found it in other galls." The above statements have led me to again examine the matter, and inasmuch as I cannot find evidence in support of the writer's views, but rather to confirm my own, I desire to record my observations.

This year I noted that the *Gelechia* galls were of full size before *P. Scudderiana* escaped from the pupa, and *G. gallæsolidaginis* escaped from

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its gall before those of the other were completely formed. These were observed as slight swellings or rings about the middle of July, and to grow quite slowly, attaining full size by the beginning of September; besides, the *Paedisca* galls, as a rule, are in entirely different situations, as pointed out in the previous paper referred to. The *Gelechia* galls are ordinarily on the stem below the branches, and usually only one occurs on the same plant; the other forms them higher among the branches, or, as often happens, on the branches themselves. As many as eleven galls have been counted on one plant. Likewise the differences of form, structure, position and date of appearance between this gall and that of *Trypeta solidaginis*, render it quite improbable that the one has any relation to the other. There is no other known gall that could be suspected.

I have again this summer observed larvæ of this species of all sizes in galls of corresponding sizes, from mere protuberances on the tender stems up to the well formed characteristic galls. This, it seems to me, is direct evidence of its gall-making habits.

The following experiments have a tendency to confirm such belief. Some Golden-rods, late in June, were planted in a bottomless pail sunk in the earth of my garden and closely covered by a net of tarlatan; some days later several old galls containing living pupæ were placed under the net. Early in July moths were observed within. August 8th the net was removed and several small yet unmistakable *Paedisca* galls were found on the Golden-rods. September 11th, the same are nearly of the usual size at maturity; no larvæ have appeared among the leaves at any date since the cover was removed. August 10th, I removed about a dozen of different sizes from their galls to the leaves and flowers of the above mentioned isolated plants; in a day or two all had disappeared except one which was boring into the stem at the axil of a branch, and at the end of a week it had caused a slight gall-like enlargement of the same. At another time a number of larvæ of different sizes were taken from their galls and placed on leaves and flowers of their food-plant in a feeding box; they refused to feed, and after days of ceaseless effort to escape died of starvation. Perhaps this result should have been expected, rather than submission to so material a change of food and residence.

After diligent search I have not found what I take for this larva feeding on the leaves or flowers, and in but one instance have I found it in any but its own gall, then in what was apparently an abandoned one of

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the *Gelechia*, in which, as it seems to me, it had taken refuge after an accident to its own home.

I do not deny, however, that it may feed elsewhere upon leaves and flowers of the Golden-rod, or that it may occupy other galls; but I feel sure that, at least in this vicinity, it habitually makes the abundant gall in which it resides.

DESCRIPTION OF THE PREPARATORY STAGES OF NEONYMPHA AREOLATUS, SMITH-ABBOT.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—Nearly globular; the surface smooth under a low power, but under a high one, thickly covered with shallow depressions, which are irregular in size and also in form, being pentagonal, rounded or oval; color pale green. Duration of this stage about 6 days.

YOUNG LARVA.—Length .12 inch; cylindrical, nearly even, tapering a little posteriorly, the last segment bluntly forked; color delicate green; over the surface many white hairs, and among these are black clubbed hairs disposed in longitudinal rows, four on the dorsum of each segment, two in front, two in rear; feet and legs green; head large, about twice as broad as any body segment, sub-globose, a little depressed at top; on each vertex a short semi-ovoid appendage, at the top giving out two divergent black hairs; just below vertex, on the front, is a similar smaller appendage with single hair, and on the side half way down is a second; color black. Towards the end of this stage the color of body changes to decided green, and several longitudinal stripes appear; on either side of a dark green medio-dorsal stripe is a whitish one, a similar one on middle of side and another along base. Duration of this stage about 8 days, but depending on the weather.

After 1st moult—Length .22 inch; slender, the dorsum slightly arched and sloping posteriorly; the tails longer, tapering; color of body green, the tails faintly red; surface quite thickly covered with fine yellowish tubercular points, partly arranged in longitudinal rows, ten in all, on either side one next the medio-dorsal green stripe, one sub-dorsal, two on mid-side and one along base; under side, feet and legs green; head ovoidal, truncated, depressed at top; on each vertex a low conical process; surface rough with sharp tubercles, of varying size, each with very short bristle;

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color of back of head and of the triangle over mandibles deep green, the rest of the front and the processes on vertices red-brown, with two green patches on front, one on either side the suture; ocelli emerald-green. But some larvæ have the head wholly green, the vertex process reddish; one had a brown band across the forehead, the rest green; one had the front face except the triangle brown, the cheeks green. To next moult about 9 days.

After 2nd moult.—Length .3 inch; shape as before; color yellow-green; stripes as before; head as at second stage, sometimes wholly green, sometimes partly brown; one example had the left cheek brown, the other green. To next moult about 7 days.

After 3rd moult.—Length .7 inch; very slender, yellow-green. In all examples bred by myself this was the closing larval stage.

MATURE LARVA.—Length 1.1 to 1.3 inch; slender, thickest in middle segments, the dorsum well arched, and the slope equal either way to 2 and 12; segments 3 and 4 are creased, and divided into five rounded and nearly equal ridges; after this, there are six ridges, the front one broader than any other and flattened, the rest being somewhat rounded; 13 ends in two small tapering divergent tails; color of body yellow-green; surface thickly covered with small sharp tubercles placed irregularly, but most dense in certain longitudinal lines, one such on either side of the medio-dorsal dark stripe; one sub-dorsal from head to end of tail; two on the side, and one, more conspicuous, along base; ten lines in all; tails red-dish; under side, feet and legs, green; spiracles buff; head obovoid, truncated, the top depressed; on each vertex a little conical process, red-dish; surface rough with fine green tuberculations, among which are a few whitish ones, each with short white bristle; ocelli emerald-green in brown rings. Duration of this stage about 13 days.

CHRYSALIS.—Length, ♂ .48 inch; greatest breadth at mesonotum and also at abdomen, .18 inch; ♀ (probably) .54 inch, breadth .20; cylindrical, the abdomen stout, conical; the wing cases a little raised on dorsal side; head case very short, scarcely projecting beyond mesonotum, bevelled transversely to a sharp edge, roundly excavated on either side, the top very little incurved; mesonotum rounded, carinated, the sides nearly flat or a little excavated; color green, the edges of carina, wing cases and top of head case cream-color; surface much covered with points and small patches of whitish, not distinct enough to detract from the general green hue. Duration of this stage about 10 days.

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In 1882, I carried three larvæ to chrysalis, and all passed but three moults. I received these larvæ from Dr. Wm. Wittfeld, Indian River, Fla., 17th July. He mailed the eggs 11th July, and had obtained them by confining a female over grass. When the larvæ reached me they were in their first stage, and the

1st moult was passed 20th July.
2nd " " 29th "
3rd " " 5th Aug.
2 larvæ suspended 16th "
They pupated 17th "
A third " 20th "
Imago from last chr. (♂) 30th Aug.

(The other chrysalids I put in alcohol.)

But Mrs. Peart carried one larva to chrysalis, and it passed 4 moults. This came from

Egg laid 7th May, 1882.
Egg hatched 12th "
1st moult 2nd June.
2nd " 15th "
3rd " 3rd July.
4th " 15th "
In chr. 28th "

I have the casts of the face of this larva, which so passed 4 moults, and can compare them with casts from the larvæ raised by myself, calling the former A, the latter B:

A.—Diameter of head at 2nd moult, .023 in.; B, same stage, .023.
" " 3rd " .04 " " .057.
" " 4th " .065
" " chry. .1 " at chry. .08.

So that A and B were alike at 2nd moult; B at 3rd was between 3rd and 4th of A, and at pupation was smaller than A. In fact the larva which passed 4 moults was larger than either of mine, and the chrysalis from it measured .54 inch in length, against .48 in the other case. This chrysalis failed to give an imago, but probably it was a female, and it is possible that the difference in number of moults may be sexual.

I have had great difficulty in bringing larvæ of *Areolatus* to maturity, and I may say the same of N. *Canthus*, and in repeated instances have failed when feeding them on lawn grass. The eggs of both species are

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naturally laid on coarse grasses, and I found, this season, that by selecting *Dactyloctenium aegyptiacum* the larvæ fed more readily than before and were healthy.

Areolatus is common in Florida and Georgia, and has been taken by Mr. E. M. Aaron on the summit of one of the high mountains of East Tennessee.

CLOTHES MOTHS.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, MAINE.

Nearly a year ago my attention was especially called to the insects which prey upon woolen fabrics, and which are generally known as "clothes moths." In going over the literature of the subject at that time and comparing it with the notes which I had made from time to time, I became convinced that what we have in our books pertaining to these insects is very imperfect and faulty, and that there was need of a thorough revision. This held true, not only of the species which destroy clothing, but also of many other species in the family *Tineidæ*.

I therefore obtained, by purchase and otherwise, as large a collection as possible from all parts of the United States—over twelve hundred specimens—and sent them to Lord Walsingham, in England, for comparison with the European species. This collection has just been returned to me, and the notes and descriptions which his lordship has made on it will soon appear in the Trans. Am. Ent. Soc.

From the studies thus far made it appears that such of the European species as attack clothing have already been introduced into this country, and the probabilities are that we have no native species possessed of similar habits.

In 1841, Harris's Insects of Massachusetts appeared, in which a general account of clothes moths was given, taken from Duponchel and other European works, and including a brief description of a moth attacking white flannel in the cases of the Boston Society of Natural History, which, as he stated, agreed with the description of *Tinea flavifrontella* of the older naturalists. Harris omitted to mention whether or not the larva of this species made a case of the flannel in which it lived. Later editions of Harris's work merely repeat the same thing.

Dr. Packard, in his Guide to the Study of Insects, p. 346, described

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the clothes moth under the name *Tinea flavifrontella*, Linn.; but Linneus never described a species under this name. Packard has confounded two species in his account in the Guide, and also in his Common Insects, p. 64, as shown by Lord Walsingham. His larva is that of a case-making species—*Tinea pellionella*, Linn., while his imago is that of *Tineola biselliella*, Hum., the larva of which does not make any case. See also Am. Nat. Vol. I., p. 423, and the Report of the Ent. Soc. of Ontario, 1873, p. 27.

Clemens and also Chambers have redescribed the introduced European species as shown in the synonomy below. *Tinea pellionella*, Linn., *Systema Naturæ*, 10th edition, p. 536, 1758, is our only case-making clothes moth, so far as I can ascertain, and although redescribed under other names in this country, it has been easily recognized by European entomologists, from the description of Linneus and the earlier accounts of Reaumur. This species has an expanse of wing from 10–14 m. m. The head is of a dull ochreous color, the fore-wings grayish ochreous, with three fuscous spots, one at the end of the cell, another on the fold, a little before the middle of the wing, and the third on the cell above the last-named spot. These spots are scarcely visible, except in fresh specimens. Hind wings silky gray, lighter than the forewings. The case which this species constructs is well described in Packard's writings mentioned above. This is, in this region, our most common and destructive species, attacking all kinds of woolen clothing, carpets, furs, feathers, etc. I have bred this insect repeatedly, and find that it feeds during the summer but not in the winter, even when kept in a room warmed by a furnace where the heat was uniform day and night. The moths emerge in June and July, and some even as late as August, yet there is but a single generation annually, so far as I have observed.

Tineola biselliella, Hum. Ess. Ent., 3, 13, p. p. 6–13; 1823. This species was separated from the genus *Tinea* by Herrich Schæffer, because of the absence of the maxillary palpi. It has an alar expanse of about 14 m. m. The head is dull ochreous, differing but slightly from that of *pellionella*. Fore-wings pale ochreous, without spots. Hind wings somewhat lighter. This insect does not construct any larval case, but according to Stainton, webs together portions of the substance upon which it feeds into a cocoon before changing to a pupa. It feeds on woolen stuffs, furs, feathers, horse-hair, linings of furniture, dried plants, etc. Packard describes the imago of this species under his *Tinea flavifrontella*.

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Tinea tapetzella, Linn. *Systema Naturæ*, 10th ed., vol. I., p. 536, 1758. The alar expanse of this insect is about 18 m. m. Head and face white. The wings black from the base to the middle and white beyond, the black color extending out a little further on the costa than on the hinder margin. The white of the outer portion of the wing is more or less clouded with dark gray, and there is a small black spot at the anal angle, and two or three at the apex of the wing. Hind wings pale gray. This species is apparently quite rare in this country. The larva in Europe feeds on animal matters, pelts, felts, carpets and also on dried plant substances, forming a gallery of the substance on which it occurs, thus destroying much more than it eats.

In 1776 Denis and Schiffermiller published a catalogue of the insects in the Royal Museum in Vienna, giving very brief descriptions of the species, one of whieh they called *Tinea flavifrontella*, and their deseription was as follows: "Shining gray moth with yellowish head. Larva unknown." The type in the Vienna collection was long ago destroyed, and from this meagre description it is now impossible to tell what the insect is. Fabricius next used the name in his *Entomologia Systematica*, Vol. 3, part 2, p. 305, (1794), for an insect in the collection of Bosc, and states that the larva feeds on insects and feathers, but it is not certain that he ever saw the type in the Vienna collection, if, indeed, it was even then in existence.

In 1801, Illiger issued a second edition of the Vienna catalogue, and gives not only what is in the original edition, but adds the description by Fabricius, which may not pertain to the Vienna moth at all. In 1821 Charpentier published the notes which he made on an examination of the insects in the Vienna collection, and states that the type of *Tinea flavifrontella* was not in the collection, but at what time it was destroyed I am not able to learn. In 1833 Treitschke published the description of a moth under the same name, giving the credit to the Vienna catalogue, but it is quite certain that he did not know the original type of *Tinea flavifrontella* for it had disappeared long before he made his studies on the microlepidoptera.

In 1823, Hummel described a clothes-destroying moth, under the name of *Tinea biselliella*, which was, without much doubt, identical with the species described by Fabricius, Hubner and Treitschke, but as they had used the name given in the Vienna catalogue for an unknown and per-

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haps different moth, the name *biselliella* is now universally accepted, and *flavifrontella* is dropped from the lists.

The synonomy of the above species is as follows :

TINEA PELLIONELLA, Linn. *Systema Naturæ*, Vol. I., X., Ed. 1758.

Tinea carnariella, Clem. Proc. Ac. Nat. Sci. Phil., pp. 257, 258. 1859

Tinea griseella, Cham. Can. Ent. V., p. 88. 1873.

Tinea flavifrontella. Pack. Guide, p. 346 (larva only). 1872.

This is our case-making species, and should be known by the name of *Tinea pellionella*, Linn.

TINEA TAPETZELLA, Linn., *Systema Naturæ* Ed. X., Vol., I., p. 536. 1758.

This is a gallery-making species.

TINEA BISSELLIELLA, Hum. Ess. Ent. 3, 13, p. 6–13. 1823.

Tinea Crinella, Treits Schm. von Eur., B. IX., p. 21. 1832.

Tinea Destructor, Steph. Ill., Vol. IV., p. 346. 1834.

Tinea Biselliella, Zell. Isis. 1846.

Tineola Biselliella, H.-S. Schm. von Europa, Vol. V., p. 81. 1853.

Tinea lanariella, Clem. Proc. Ac. Nat. Sci. Phil., p. 258. 1859.

Tinea flavifrontella, Pack. Guide, p. 346 (imago only). 1872.

This is not a case-making species. It should be known by the name of *Tineola biselliella*, Hum.

NEW MOTHS.

BY A. R. GROTE, A. M.

Copablepharon Longipenne, n. s.

Eyes naked ; tibiæ spinose. Fore wings clear light buff yellow with an outer line merely a succession of minute dots, at usual place of s. t. line. Hind wings fuscous with pale fringes. Head and thorax yellow ; pectus and palpi whitish. Beneath the whitish wings are clouded with pale fuscous. A little slighter than *Absidum* (= *Aedophron grandis* of Strecker). Montana Coll. B. Neumoegen, Esq.

Copablepharon Subflavidens, n. s.

Eyes naked ; tibiæ armed ; fore tibiæ with a very slight claw in addition. Primaries pure light yellow, immaculate. Hind wings pure white,

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immaculate. Abdomen white; white beneath. Montana, Coll. B. Neumoegen, Esq. Size of the other species. *C. Album* is also in the collection before me.

Arsilonche Henrici Gr.

After examining specimens of the European *Albovenosa*, not one was the same as *Henrici*, which is not so strongly marked. I conclude that Mr. Morrison has been hasty in pronouncing them the same.

Mamestra Gnata, n. s.

♂. Allied to *vicina (=teligera)* but differing by larger size, darker color and the rounded not kidney-shaped reniform. Hind wings white, iridescent, with dark veins. Primaries with straight costa and determinate apices. Dark fuscous gray, with a brownish tint on median space. A pale patch before internal angle, prominent. Reniform with incomplete inner annulus, pale shaded, contrasting, rounded. Orbicular darker, smaller, a little oblique, with a fine pale ring. Head and thorax dark gray. Beneath hind wings white, no marks, costa gray. Primaries gray superiorly with discal point indicated and commencement of a mesial line shaded with white. Arizona. Coll. B. Neumoegen.

Mamestra Glaciata, n. s.

♂. Eyes hairy. Allied to *Leucogramma*. Primaries dusky olive with the lines black, vividly edged with white. Reniform and orbicular white-shaded. A white spot beyond the concolorous claviform, attached to the dark rivulous median shade line. Fringes interrupted markedly with pale. Hind wings blackish fuscous, with white-tipped fringes and faint mesial line, paler at base. Thorax and head mixed with white and fuscous scales, agreeing in appearance with fore wings. Beneath fore wings fuscous, with distinctly checkered fringes; hind wings whitish at base, with a distinct oval discal spot and double exterior shaded lines. A fine basal ray. Arizona. Coll. B. Neumoegen. Belongs to *Dianthoecia*.

This is close to the European *Magnolii*. The orbicular is larger, the olive ground color less apparent, the white more plentiful. Though closely allied, it is unlikely the two insects are the same.

Helotropha Sera G. & R.

This is allied to the European *Helotropha Leucosigma*.

Apamea Inquaesita G & R.

This species is incorrectly cited in my "New Check List" as

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"Gortyna quaesita." How the error occurred I cannot now tell. The species of these two genera should read as follows, synonyms omitted:

Helotropha Led.

Sera *G. & R.*
Reniformis *Gr.*
Var. Atra *Gr.*

Apamea Tr.

Purpuripennis *Grote.*
Juvenilis *Grote.*
Nictitans *Esp.*
Inquaesita *G. & R.*
Erepta *Gr.*
Immanis *Guen.*
Obliqua *Harv.*
Stramentosa *Guen.*

Thalpochares Fortunata, n. s.

Size small. Front embossed. Vestiture of flattened scales. Aspect of *Patula.* Fore wings deep yellow, shading to whitish over head and thorax, and with a pale terminal even shade line. Primaries with no markings except a prominent broad, leaden-hued, bent median band, edged with pale, resting on inner margin and expiring on cell at about the place of the reniform. Hind wings translucent, stained with yellow; fringes whitish. Beneath the body is white and the immaculate wings suffused with deep yellow. Arizona, Coll. B. Neumoegen.

Thalpochares Perita, n. s.

Allied to *Fortunata;* wings a little narrower. Eyes naked; clypeus full. Fore wings pale yellow to a leaden band situate outside of the pale t. p. line, which is illegible; terminally the wing is clear buff yellow. Hind wings translucent, stained with yellow. Body white beneath. Wings stained with deep yellow. The band on primaries is oblique, rather narrow and expires before costal region. Arizona. Coll. B. Neumoegen.

Melicleptria Celeris Grote.

A true *Melicleptria,* as I find from a fresh example in Mr. Neumoegen's collection. Hind wings brilliant orange red, concolorous. Fore wings with the usual pale blotches confined to a couple of pale spots at middle, vinous purple, slightly overlaid with sericeous. Thorax with the usual silky, olive or yellowish, hair. Abdomen blackish above. It may head the series as arranged in my "New Check List."

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Oxylos citrinellus G. & R.

Eyes a little narrower than *Heliothis*, naked, unlashed; tibiæ spinose; fore legs with a claw and three outer curved spines, besides the spinules. Only slightly by the armature of the front legs and the narrower eyes and smoother front does this differ from *Heliothis*, and I should prefer not to separate it in future. *Lucens* and *Spinosae* are doubtfully in their right place, and I should prefer to restrict *Heliothis* to *armiger*, *phlogophagus* and *luteitinctus*, *lupatus*, *citrinellus*, *cupes* and *nuchalis*.

Tripudia Gr.

In *T. Versuta*, the lashless eyes are naked; ocelli; tibiæ slender, unarmed; front smooth; a ridge of scales behind the head. Sub-basal space ochery; basal dark fuscous; median again darker, narrow; a rivulous black median shade; t. p. line black, roundedly exserted opposite reniform which is defined by a lilac shade; s. t. line irregular, much shaded before with black, partly followed by a lilac shade; s. t. space anteriorly ochery; squamation lustrous; beneath discolorous with a pale streak along internal margin and some yellow specks along costa; hind wings broken up with whitish and a dark discal lunule. *Type* Coll. Neumoegen. Whether distinct from *Flavofasciata*, I am not now certain. The species is minute, pyralidiform.

Spragueia Grote.

This genus is so distinct from the European *Erotyla*, with its one species, by the neuration, as I have shown, that to unite it would oblige every genus in the sub-order dependant on neuration, to be subverted. Dr. Herrich-Schaeffer expressed his opinion to me that the two were distinct. The fore wings are narrower, the clypeus differs, the ornamentation is peculiar in *Spragueia*. We have many species; the genus comes to our fauna from the South.

Matigramma Rubrosuffusa, *n. s.*

This species is fuscous, the underlying tint is a pale reddish, appearing in the pale red subterminal line. Male antennæ ciliate. A little larger than *Laena*, which is wholly griseous and fuscous. Fuscous lines double, marked on costa of primaires; s. t. line continuous, more broken into dots on primaries. Fringes indisdinctly checkered. Upper surface of wings similar; the hind wings show a pale streak on submedian space; fringes on internal margin whitish. Body concolorous. Beneath ashen;

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a fine common angulate dark mesial line. Very indistinct discal dots ; an inner line on fore wings ; outwardly the wings are darker. Arizona ; larva on scrub-oak, chrysalis pruinose (I. Doll, Esq.)

Tripudia Lixiva, n. s.

Size small. Eyes naked. Scales of the body flattened. Palpi incurved ; third article exceeding the front. Base of fore wings gray. A very broad median olive brown band, bordering t. a. line outwardly, interrupted at costal region. T. a. line a little waved, pale, emanating from a small black costal spot. A large black costal spot at middle, inaugurating the pale narrow, sinuate median shade line, forming the outer margin of the olive brown band ; terminal portion of wing reddish brown, on which the vague reniform is apparent. S. t. line irregular, dark shaded superiorly, waved ; terminal space slightly grayish ; fringe yellowish, interrupted by a blackish spot opposite cell. Body and hind wings gray. Arizona. Coll. B. Neumoegen.

Allied to *Opiparus*, but smaller, the median fascia broader, the outer half of the wing redder and more like *Basicinerea* in this respect.

Eugonia Vidularia, n. s.

♀ Apices of primaries pointed ; outer margin strongly angulate opposite cell ; hind wings "tailed." Very pale yellowish. An outer dark narrow line, fainter inferiorly, continued across hind wings. On fore wings the surface is a little darker about the inception of this line and on secondaries without it. At apical excavation the fringe is dark. Beneath still paler, irrorate ; a narrow common line and slight discal marks. Disc of thorax buff or darker ; body pale. Size of *alniaria*, but slighter. Arizona. Type Coll. B. Neumoegen, Esq.

Cymatophora (Boamira) Dataria, n. s.

♂. ♀. Allied to *Pampinaria*. In the male the median lines are shaded with black, in both sexes propinquitous, very oblique, angulate, followed by an indistinct (♀) or distinct (♂) brown shade occupying the anterior half of subterminal space. S. t. line scolloped, distinctly marked with white in male. Hind wings gray at base (♂), or concolorous (♀). The color of female is more obscure fuscous. Mesial line bent opposite cell. A faint annulus. The outer field beyond the line copies the markings of primaries. Size of allies. Beneath gray, discolorous with discal marks diffuse, blackish, wanting on hind wings in male. Types. Coll. B. Neumoegen, Esq., Arizona.

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Lythria Fultaria, n. s.

♂. Aspect and color of *Fidonia*. Front wide, even; eyes naked; ♂ antennæ strongly setose; labial palpi, exceeding the front, loosely haired. Wings entire, roundedly bent at middle. Body slender. Fore wings with alternate fuscous and pale reddish bands; veins a little marked; fringes black, except at apices where they are white. Hind wings dark yellow with black marginal band and a sub-basal line ending the darker basal field; a mesial band enclosing a yellow streak. Beneath fore wings dark yellow with a mesial black line, angulate and touching the black discal spot. A pale apical patch; an outer bent subterminal line beyond which the wing is blackish. Hind wings dull like primaries above, pale reddish brown with two brown bands. Arizona. Coll. B. Neumoegen, Esq. This may belong to a different genus; the colors are those of *Botis subsequalis*. Again here I note the singular way in which the upper wings beneath are like the lower above and *vice versa*. I allude to this in my essay; it must be dependent on the exposure of the surfaces.

Cyclica, n. g.

I refer to the *Larentinae*, a singular large-winged Geometrid with the primaries unusually long and wide and produced apically. Hind wings much elongated; cell closed; veins 2, 3, 4, 5 nearly equi-distant; submedian space wide. Labial palpi prominent. Clypeus uneven; eyes naked; no ocelli; ♂ antennae serrate, ciliate.

Cyclica Frondaria, n. s.

♂. The form is an exaggeration of *Tornos*, but much wider winged. Fore wings blackish, thinly scaled; paler below median vein, outwardly. Some black and white marks along submedian fold and two or three oblique black apical marks. Indications of transverse bands but all obscure. Hind wings pale fuscous with dark marginal line. Beneath immaculate, very pale fuscous, whitish over hind wings. Size large. *Type* Coll. B. Neumoegen, Esq. Arizona.

Fota, n. gen.

Eyes naked; fore tibiae slender, closely scaled, with a short claw. Clypeus with an exceedingly prominent wedge-shaped protuberance, surmounting the greatly exserted infra-clypeal plate. Body slender, short, untufted. Fore wings amygdaliform, narrow; hind wings wide, full; fringe long.

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Fota Armata, n. s.

♀. Tortriciform. Fore wings gray, with a black shade along the cell, connecting the median stigmata and preceding the orbicular. Stigmata concolorous; orbicular round, reniform upright. A long black shade on median space over submedian fold. Lines obsolete. Fine black interspaceal terminal streak. Hind wings pale, with white fringes; abdomen pale, yellow beneath at tip. Beneath pale without marks. Size of *Hadena Cylindrica*. Arizona. Coll. B. Neumoegen.

This singular genus seems to me an aberrant Hadenoid form.

Tamila Lucens Morr.

On account of the flattened scales on head and thorax I would refer this species and *Meadi* to *Tamila*. I am aware that the character is slight but by separating the species into the genera *Tamila, Heliothis, Melicleptria, Lygranthoecia* and *Anthoecia*, we get consonant assemblages of species, agreeing in their different characters. In the Bulletin of the Buffalo Society Natural Sciences I threw them all in *Heliothis*, but there seemed nothing gained by this and the identification of material was thereby rendered much more difficult.

Luxuriosa, n. var.

A form of *Lucens* from Montana wanting the white admixture of scales over fore wings: subterminal space dark lilac—purple; lines very fine, white, contrasting; yellow of hind wings deeper than type.

Cucullia Montanæ, n. s.

♀. Allied to *Asteroides*, but with the collar wholly pale, whitish, edged with dusky. Tegulae also pale, ochrey white; thoracic tuft dusky. Ornamentation like *Asteroides*, but with the ground color pale ochrey; the black costal shades show the three pale ante-apical dots distinctly and they are larger. The stigmata much more distinct, pale, broken by ocher spots The anal brown streak, distinct against the pale, ochery white ground; no gray. Montana; coll. B. Neumoegen, Esq.

There is no fine black longtitudinal hair line at base of fore wings and the teeth of t. a. line seem blunter. As the species are very close in this genus I have little doubt the present is entitled to a designation as such. It is quite distinct in appearance and can be at once detected. Much more distinct from *Asteroides*, than is the European *Asteris*.

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Synedoida Insperata Gr.

♂ Antennæ serrate, ciliate; eyes naked; tibiæ apparently unarmed; thorax thickly hirsute. Palpi exceeding the front, pale gray; pectus blackish. Hoary gray; median field of primaries olive-ocher, defined by the median lines of the usual shape, cut by the shaded brownish median shade, uneven and obscuring the illy defined concolorous reniform. T. p. line shaded outwardly with black below costa. Costal edge carneous. S. t. line nearly lost, indicated at costa. Hind wings fuscous with whitish fringes. Size of related species. Thorax gray; head darker. Beneath unlined, pale gray, irrorate; discal marks present. Arizona; coll. B. Neumoegen, Esq.

OBITUARY.

Charles G. Siewers died at his residence, Newport, Ky., Sept. 6th, in the 68th year of his age. For many years he has been a devoted and enthusiastic student of entomology. He spent much time in rearing the larvae of Lepidoptera, making colored drawings of them through their stages of growth. He collected largely in Coleoptera and was a very accurate observer of habits. It is due to his skill as a collector that some of the rarest species have been recorded as occurring in this locality.

CHARLES DURY.

Avondale, Oct. 4th, 1882.

ON THE MOUTH OF THE LARVA OF CHRYSOPA.

(By William Saunders, London, Ont., read before the A. A. A. S., at Montreal.)

Recently I had the opportunity of watching in a live box, under a low power of the microscope, the seizing and devouring of some plant-lice by the larva of an undetermined species of Chrysopa, and was interested in the manner in which it emptied the body of its victims. The jaws are large, hooked, pointed and tubular, with a small opening at or near the points. Approaching its prey the body of the Aphis is grasped by the hooked mandibles which at the same time pierce it. The Chrysopa larva remains stationary, and proceeds to pump its victim dry. At the base of

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each of the mandibles the integuments are dilated into a sac-like form capable of expansion and compression at will, a portion of the thorax is similarly constructed, and it is by the repeated dilating and compressing of these sacs that the fluid contents of the body of the Aphis are transferred through the tubular mandibles to the stomach of the Chrysopa larva.

When the abdomen of the Aphis has been emptied, the points of the mandibles of the Chrysopa larva are thrust in the thorax, and forward into the head in every direction, and in a few moments nothing remains of the once plump plant louse but a shrivelled skin. In the author's accessible, I an find no reference to these elastic bulb-like sacs at the base of the mandibles, nor to the peculiar structure of the thorax, which admits of its expansion and contraction as referred to.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

(Continued from page 151.)

Prof. J. A. Cook stated that from the European iarch he had taken about 250 cocoons of *Samia Columbia*, and found among them one peculiar cocoon, very similar to that of *Columbia*, which eventually produced a *cecropia*.

Dr. Jewett thought it was probably a case of hybridism, as he himself had taken hybrids of *Gloveri* and *cecropia*.

Dr. Hagen had seen cocoons of *cecropia* so similar to those of *Columbia* that it would be very hard to discriminate between them.

Dr. Hagen also gave a very interesting account of an expedition to the Northwestern Territories from which, in company with Prof. Henshaw, he had just returned.

In the north of Washington Territory he found the forests and country generally in splendid condition, and comparatively free from any insect pests.

In other parts he had found the Yellow Pines most seriously affected by the attacks of *Pieris marcupia (?)*, large tracts of forests being entirely devastated—and large trees being attacked as well as the younger ones. The Butterfly appeared there last year for the first time—eggs were found on July 24th. The larva has the habit of dropping from the trees by a thread, a peculiarity only noticeable in a very few of the Rhopaloceræ.

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A tree once attacked never seems to recover, and the only way to check the ravages of the insect is to cut down those trees affected.

In Montana the cattle feed out all the year round on the "bunch" grass, which is of inestimable value to that country. A curious fact to be noticed is that wherever timothy and blue grass is introduced it seems to kill out the bunch grass, so that the advance of civilization may in fact entirely alter the economy of the country.

The grasses do not seem troubled as yet with any pests.

The Colorado potato bug is merely known in certain localities.

The fruit trees are troubled only by flies and ants, so that the territory is nearly free from noxious pests.

Prof. Henshaw said the expedition was one of great interest.

A curious feature was the late hours at which insects appeared to feed, many of them after sundown.

Papilio machaon was found in great numbers.

Carabidæ were found in dry places, whereas in the East they usually preferred moist situations.

The genus *Callopteryx* was also found. This was especially noticeable as it had never been known to occur west of the Rocky Mountains.

After this a considerable time was spent in informal discussion and examination of interesting specimens brought by members from various parts of the continent, and the meeting then adjourned.

THE GRAPE BERRY MOTH—Lobesia botrana.

BY THE EDITOR.

This insect is an imported species and has long been injurious to grape culture in the South of Europe. The exact period of its introduction to America is not known, and it is only within the past few years that attention has been called to its ravages. When abundant it is very destructive, in some instances it is said to have destroyed nearly fifty per cent. of the crop.

During the past season it has been very abundant in the neighborhood of London, there being very few vines the fruit of which has not been more or less injured. The young larvæ have usually been first observed

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early in July, when the infested grapes show a discolored spot where the worm has entered. [See fig. 21, *c*.] When the grape is opened and the contents carefully examined there will usually be found in the pulp a small larva rather long and thin, and of a whitish green color. Besides feeding on the pulp it sometimes eats portions of the seeds, and if the contents of a single berry are not sufficient, two, three, or more are drawn together as shown in the figure and fastened with a patch of silk mixed with castings, when the larva travels from one to the other, eating into them and devouring their juicy contents. At this period its length is about an eighth of an inch or more; the head is black and the next segment has a blackish shield covering most of its upper portion; the body is dull whitish or yellowish green. As it approaches maturity it becomes darker in colour and, when about one third of an inch long is full grown, see *b*, figure 21. The body is then dull green with a reddish tinge and a few short hairs, head yellowish green, shield on next segment dark brown, feet blackish, pro-legs green.

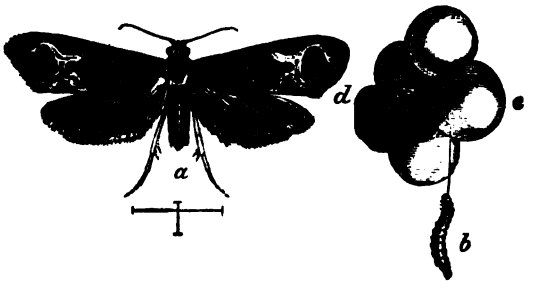

FIG. 21.

When the larva is full grown it is said to form its cocoon on the leaves of the vine, cutting out for this purpose an oval flap, which is turned back on the leaf forming a snug enclosure which it lines with silk; frequently it contents itself with rolling over a piece of the edge of the leaf, and within such retreats the change to a chrysalis takes place. The chrysalis is about one fifth of an inch long and of a yellowish or yellowish brown color, from which the moth finally escapes.

The perfect insect which is shown magnified, *a*, figure 21, measures when its wings are spread nearly four-tenths of an inch across. The fore wings are of a pale, dull, bluish shade with a slight metallic lustre, becoming lighter on the interior and posterior portions and ornamented with dark brown bands and spots. The hind wings are dull brown, deeper in color towards the margin, body greenish brown. It is said that there are two broods of this insect during the year. We have never

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seen them at any other time than in the autumn when the grapes are approaching maturity.

REMEDIES.—As it is possible that most of the late brood pass the winter in the chrysalis state attached to the leaves, if these were gathered and burned a large number of the insects would perish. The infested grapes might also be gathered and destroyed. This insect is attacked by a small parasite which doubtless does its part towards keeping the enemy in subjection.

CORRESPONDENCE.

DEAR SIR: Please insert the following correction of line 12, page 156, August number: For "only these little claws rather than the usual tubercles," read "only three little claws instead of the usual circlet of tentacles." V. T. CHAMBERS.

DEAR SIR: In preparing my article on *Homoptera lunata* in recent number of the CANADIAN ENTOMOLOGIST I overlooked the article by Prof. J. A. Lintner in his 4th Entomological contributions, where he gives good reasons for thinking *lunata* and *edusa*, and perhaps *Saundersii* but sexes of one species. I had seen his article but at the time of writing it did not occur to me. G. H. FRENCH, Carbondale, Ill.

DEAR SIR: Mr. A, R. Grote, p. 128, July, states in favor of his opinion that Staudinger's Catalogue did not hesitate to introduce for *Pap. Podalirius* the name *P. Simon.* But Dr. Staudinger has in the same volume, Errata, p. 422, corrected this statement: "*Podalirius* nomen est *vetustius.*" H. A. HAGEN, Cambridge, Mass.

NOTES AND CAPTURES.

PAPILIO CRESPHONTES, Cram.—I saw on the street very recently a magnificent specimen of this beautiful butterfly; it was flying slowly and could easily have been captured with a net. E. B. REED, London.

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The Canadian Entomologist.

VOL. XIV. LONDON, ONT., OCTOBER, 1882. No. 10

NEW MOTHS.

BY A. R. GROTE, A. M.

(Continued from page 167.)

Fota armata Grote.

This has somewhat the form of *Stilbia;* the fringes are long on secondaries. A second female like type in size has the black submedian dash wanting, and the filling on cell, but hind wings are like type in being pale fuscous. Base of forewings above pale ochrey shaded. Another has the primary all gray; *Armata* may be known by its larger size, fuscous secondary and different sculpture of clypeal armature.

Whether the following are really different I do not know; they appear to be so most certainly.

Fota minorata, n. s.

2 ♂, 2 ♀. Head above and collar pale ochre, paler than *armata*, and this form is ⅓ smaller. Markings very like; a pale ochrey shade over submedian space. The grey primaries have all the markings of *armata*, without the broad black longitudinal shades; the median shade is, however, noticeable and the lines indicated. But the hind wings are pellucid white with soiled costa in both sexes. Armature of clypeus agreeing, except that the central arm has a cup-shaped depression at top; this I have again gone over and seems to me a good character. Wings a little silky.

Fotella, n. g.

This in form is like *Acosmetia;* fringes to hind wings long. Eyes naked. Clypeus with a navel-like expansion. Like *Fota* in the silky hind wings which are full, but the primaries are normally shaped, entire, widening outwardly. Body untufted, eyes unlashed, palpi with small third joint exceeding front a little; tibiæ unarmed. Body slender. Wings full. A *Caradrina*-like form which seems allied to *Fota;* I think both genera may be related to *Stilbia* and *Caradrina*. Size of *Fota armata.*

Fotella notalis, n. s.

♀. Fore wings olivaceous blackish, something like *Pyrophila glabella*

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in color, with a narrow irregular paler terminal space. Lines lost. Reniform marked in white, constricted, the white scales touching median vein. Hind wings fuscous, with paler fringes and paler at base. No markings beneath. Abdomen pale yellowish gray. Arizona. Coll. B. Neumoegen, Esq.

Plagiomimicus Grote.

I called attention some years ago in the Bulletin of the Buffalo Society to the resembiance between this genus and *Polenta*, in the spreading thoracic tuftings, the modification of the clypeus, the shape of the wing and the peculiar pattern of marking, which is so much alike that the two species would be considered congeneric by most observers. I since contradict Mr. Morrison's observation that the fore tibiæ are unarmed in *Polenta;* this was the best distinction. The discovery of new forms confirms me that the genera I have grouped under *Stiriinæ* are all valid, the modifications of structure being apparent and going closely with the pattern. *Stibadium* approaches *Telesilla*, in frosting and sheen *(aureolum)*, and leads to this genus as before suggested. With the new species the group (without absolute value) may fall in between *Calpe* and *Plusia.*

Oxycnemis, n. g.

Vestiture flattened hairs; a tuft behind thorax of broad curved shining scales widening to their tips; abdomen short, untufted. Size small, body slender. Hadeni-form ornamentation. Eyes naked, unlashed. Fore tibiæ with the whole short broad joint corneous, terminating in a stout central claw or spine; the legs slender, otherwise unarmed. Notwithstanding its Hadeni-form look, the insect appears nearest to *Triocnemis.*

Oxycnemis advena, n. s.

♀. Gray, neatly lined, with the bright color and ornamentation recalling *Charadra palata.* T. a. line black, distinct, upright, attached to the large open claviform. Discal stigmata light gray, subequal, with included dots. T. p. line faint. S. t. line black with a following white shade, marked with black on costa, far from margin and easily taken for t. p. line, curved in inferiorly; veins terminally finely marked in black. Hind wings pale fuscous, whitish at base. A white costal shade on primaries above from inception of s. t. line over the disk. Size small. Arizona, Coll. B. Neumoegen, Esq.

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Ripogenus pulcherrimus Grote.

This insect is so rare that I have never owned a specimen. Since describing it, twenty years ago, or nearly, I took a figure of it with me to England, and, comparing it there with *Eutelia*, I believed it belonged to an allied but different genus. At the time I described it I did not know the European species even by figure. Mr. Tepper has a specimen taken on Long Island which he showed me in his beautiful collection. I left it catalogued under *Eutelia* in my Check List till I could verify my belief and print this note for those who may be fortunate enough to have material to examine.*

Chariclea Kirby.

The European species catalogued by Lederer under this genus are not congeneric. I have separated *Pyrrhia*, which has one or two European and three American species, all closely allied and agreeing also in style of markings and color quite closely. Our only true *Chariclea* seems to me to be *Pernana*. *Cirrhophanus triangulifer*, again examined since my return home, differs by the want of tibial armature, as to which I was uncertain, and in the clypeal structure, as observed by me. The ornamentation is, however, similar, and the untufted abdomen proportionately slender. Figured in my Essay—plate 3.

Trama Griseipennis, n. s.

Larger than *arrosa*, of a pearly gray. The male shaded with fuscous before the curved, flexuous, pale s. t. line. T. a. line broken, dark. Reniform small, indicated. T. p. line followed by a pale shade. Both outer lines continuous on hind wings, divergent. Fore wings pointed at tips. Color and appearance of both wings similar. In male the dark shading continued within the outer line on secondaries. A festooned dark common terminal line, fringes pale gray. Beneath darker, somewhat brownish; faint traces of double outer common lines. Arizona; Coll. B. Neumoegen, Esq.

Anytus Sculptus var. *Planus.*

This is a form of *Sculptus* of which I have now seen two or three examples, one in Mr. Hill's extensive collection, in which the median lines

* Since writing this I have Mr. Smith's valuable observations on the genera of *Noctuidæ*, and note his remarks on this genus. I do not see or receive the Bulletin in which it appeared, but am indebted to Mr. Smith's kindness for the copy.

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are lost and the wing is longitudinally shaded with whitish on median space along internal margin, and diffusely beyond the reniform. New York.

Agrotis Hospitalis, n. s.

Allied to *baja* by the black mark, inaugurating s. t. line. Yellow-brown. Half-line black, single; t. a. line black, single, broken, irregularly trembled or denticulate; a dot between these lines on median vein. T. a. line marked on costa; t. p. line appearing as a pale even shade, preceded by broken black scallops not evident, the line itself. Orbicular large, round, paler than the wing, ringed with black, the costa above it pale like the spot itself. Median field shaded with darker brown behind. Reniform ringed with black, kidney-shape, paler than wing, dark or black inferiorly. An interrupted dark terminal line. Fringe concolorous. Hind wings rather pale, silky, concolorous. Palpi dark brown at the sides, tipped with pale brown like front in color. Mr. Hill's collection, N. Y., July at sugar.

Gortyna Impecuniosa Grote.

This is a dark species, almost recalling *nebris*. Dark purple brown with the median field rusty. Stigmata darker-ringed, concolorous, all indicated. A faint apical yellowish patch, inaugurating s. t. line, which is lost or fragmentary. Hind wings dark fuscous. A sharp tuft behind the collar. Mr. Hill's collection, Centre, Sept. 25.

This is allied to *Harrisii*, etc., but, I think, distinct. It is the most obscurely marked of any of the purple-brown species. One male. Size of *Harrisii*.

Rheumaptera Immediata, n. s.

Pale gray with all the transverse markings indistinct except the two black shaded median lines distinct, enclosing the reddish brown median space. Inner line *curved*. The lines are rather neat. The outer with a strong submedian curve, projected somewhat narrowly at median vein. Costal dots distinct. Basal line fine, not very noticeable. Beneath with an evident angulate common outer line, sub-punctate, terminal space shaded outwardly and especially over apices with brown. Discal dots and, on fore wings, a costal dot, marking inner line. Hind wings above pale, with a mesial sinuous line. Under surface darker than upper. Expanse 26 mil. Two specimens, Mr. Hill, New York.

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Thamnonoma Quadraria, n. s.

♂. Body slight, wings ample, entire, apices pointed, external margin very moderately rounded. Gray. Median lines sub-parallel, straight, blackish; inner line broken, a little curved, outer straight; the lines tolerably near together; subterminal line most prominent, diffuse, black, edged inwardly by a brownish red shade, its outer edge jagged, denticulate; the line itself runs inwardly opposite cell and approaches outer median line at median vein, thence running parallel with it and approximate to internal margin. A black apical mark; fringes gray. Hind wings light gray. Discal dots distinct on both wings, both above and below, black. Under surface gray, lines obsolete. Expanse 31 mil. Colorado, Dr. Bailey.

This species may be known by the well pectinate male antennæ, the non-falcate primaries and the singular course of the distinct subterminal line and its form and color. It approaches the genus *Lozogramma*, but I think is correctly referred here.

Thamnonoma Perpallidaria, n. s.

♂. Antennae pectinate. Pale fady ochrey. Two parallel, even, dark ochre median lines, starting from brown costal dots. Subterminal line broken, diffuse, dark. Hind wings very pale, with mesial line indicated at internal margin. Beneath pale ochrey, without marks. Body pale ochrey. *Expanse* 27 mil. New Mexico. No. 993, Prof. Snow. Smaller and differently colored, but allied to *T. Quadraria.*

Homopyralis Miserulata, n. s.

Small and slight bodied. Dull brown. Median shade black, distinct, waved, upright, touching the small black reniform. Wing paler over median space beyond the shade. T. p. line rounded opposite cell. Before the s. t. line the space is shaded with blackish. Fringes pale dotted. Hind wings concolorous with two divergent mesial lines. Beneath paler, with the discal dot contiguous to the inner of the two divergent lines on hind wings. Body brown. *Expanse* 20 to 22 mil. Three specimens. New Mexico, Prof. Snow.

Tornos Interruptaria, n. s.

♀. Light gray, a little larger than *Rubiginosus.* The fine black median lines make an oblique loop open to internal margin. Above they make another larger, less distinct loop, its pointed apex curving up to median vein. Hind wings light gray; indication of lines on internal mar-

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gin. Body gray. Beneath without dots, light gray or whitish, with dark powderings. Arizona. Coll. B. Neumoegen, Esq.

Tornos Escaria, n. s.

♂ ♀. Fore wings fuscous gray, with a blackish discal lunule. Median lines hardly visible, apparently sub-parallel, oblique, accented on submedian fold by dots. Hind wings whitish on disc. A mesial dot; a fuscous outer band; internal margin grayish, showing commencement of mesial lines. Head and thorax dark gray; abdomen centrally somewhat ochreous; terminally gray. The male is smaller and darker, grayish fuscous; the dots on disk evident. Arizona. Coll. B. Neumoegen, Esq.

Tornos Ochrofuscaria.

♀. Allied to *Interruptaria*, without discal dots. Wholly sordid ochrey fuscous. The lines fine, sub-obsolete. Beneath the hind wings are somewhat whitish, powdery with dark. The entire insect is of this obscure ochrey color, above and below, and should be known by this and the apparent absence of determinate markings. Of *Interruptaria* I have two specimens; when the curious median lines are effaced, the species is known by its gray color and want of discal dots. Of *Escaria* I have two females, one the smaller; the smaller and darker male agrees in the accented median lines on submedian fold and discal dots. Of *ochrofuscaria* I have only one female. Coll. B. Neumoegen, Esq. Arizona.

Glaucoptery.x Aurata.

Forewings like *Cumatilis*, with transverse lines and olive shading, but hind wings pure orange. Both wings reddish beneath. It is of the same size as *Cumatilis*, and the markings of primaries, while darker, are so alike that a detailed description is quite unnecessary.

Tamila Tumida Grote.

Notwithstanding its aberrant color, this species belongs more naturally here, as I find from a specimen in Mr. Neumoegen's colleetion.

Heliothis nuchalis Grote.

I can find no difference that seems to me important between this and the European *Scutosus*.

Hydriomene Reflata, n. s.

♂ ♀. Male antennæ ciliate; palpi prominent. Size of *Speciosata*. Fore wings sordid gray with distinct black lines. Extreme base black; a slightly waved and outwardly oblique black sub-basal line. A wide black

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band, fainter above, broken and angulate at cell, broader and blacker below median vein, the most prominent marking of the wing. Near to this the inner median line, subsinuate, projected and broken just before internal margin. Outer line roundedly projected over median nervules; the sub-terminal line runs parallel with this, and is joined by a black apical line. Fringes black dotted; a more prominent black mark at end of veins 2 and 3. Hind wings pale fuscous, with whitish, fuscous-dotted fringe, and two faint extra-mesial lines. Beneath pale. Arizona. Coll. B. Neumoegen. This species exceeds 30 mil. in expanse, and cannot be confounded with any other. Very different from any of the forms of *Sordidata*, which I unite in the "New Check List," and cannot distinguish.

Hydriomene Reflata is a stout species, which can be known by its whitish ground color of primaries showing a slight sprinkling of brown scales, by the presence of an inconspicuous white spot outside subterminal line opposite the disk and by the wide black band before the inner median line, interrupted or angulated on the cell and less prominent above it on the costa. All the examples agree perfectly.

Eustrotia Flaviguttata, n. s.

A small species comparable with *Secta*. Uniformly mouse gray sprinkled with brown dots which, under the glass, take the course of angulated transverse lines running first outwardly from the brown costal dots. The only marking of prominence is the brown mesial shade which encloses a small yellowish spot on the cell and another less noticeable on submedian fold. A brown costo-apical shade patch enclosing a pale costal dot. A terminal dotted line. In the place of the reniform is a dark dot. Hind wings fuscous. *Expanse* 16 mil. Texas, in my collection.

Eupseudosoma floridum, n. s.

Allied to the Cuban *E. niveum* Gr. Head dark yellow above; clypeus white; a dark line dividing the yellow vertex from the white front. Collar and thorax immaculate white. Fore wings white, slightly iridescent; costal edge dark fuscous. Abdomen scarlet above with dorsal white line; anal segments white. Hind wings reduced, white, a few basal scarlet hairs. Beneath white, fore legs dark outwardly. Florida, A. Conradi, Esq.

This may be same as the Cuban form, but there are no black spots on head or wings. The costal edge is smoky.

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Eupethecia Gypsata, n. s.

Clay white. A large brownish-black patch on costa over the cell enclosing discal mark. A costo-apical dark divided patch. External margin marked with brownish twice: opposite cell, and above internal angle. Fringe dotted. Costal edge at base marked with dark brown. Beneath a s. t. pale band, edged with brown bands marked on costa. A discal dot. Fringe of fore wings pale, dark-dotted. Hind wings whitish, with the terminal border broken into lines; mesial lines incomplete; a discal dot; beneath with the mesial lines more continuous. Thorax pale; collar a little darker. Two specimens. Arizona. Coll. B. Neumoegen, Esq. This distinct species is of the size of *Nevadata.*

Pleonectyptera Historialis, n. s.

Allied to *Phalaenalis.* Fore wings varying from olivaceous to ochrey reddish. Hind wings reddish outwardly, pale at base. Beneath washed with red with costa of primaries yellow. Above the fore wings have a large, black, irregularly rounded reniform; two large black dots on costa inaugurate the pale median lines, which are very faint. S. t. line faint. Arizona. Coll. B. Neumoegen, Esq.

This finishes, for the present, the notes and descriptions I have drawn up for the past year, and part of which I had intended using in my "New Check List." With the latter I tried to make as few changes as possible from existing references at the time (May, 1882) of its being given to the printer. As stated in the Preface, there will be many necessary changes in the future, but the nomenclature is becoming more settled and I issued it in response to many enquiries and requests, and I am glad it has been well spoken of here and abroad. In the *Noctuidæ* there will be here and there species to be degraded to varieties, some genera probably drawn in or their characters more clearly limited, and the position of certain genera changed. In a linear arrangement the sequence must be always not entirely satisfactory. Any improvements based on structural studies must be always welcome. As a whole I think the arrangement in the "New Check List" is more satisfactory than that in previous ones from first to last. As soon as warranted, a new edition will be prepared.

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DESCRIPTION OF THE PREPARATORY STAGES OF GPAPTA COMMA, HARRIS.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Conoidal, the base flattened and rounded; marked by 10 vertical ribs which near the base are low, but on upper third are considerably elevated, increase gradually in prominence and terminate abruptly around a small flat space at summit; these ribs are thin and their sides are cut by grooves perpendicular to the surface of the egg; the spaces between them crossed by many fine striæ; color green. Duration of this stage 5 days in April, 4 in July.

YOUNG LARVA.—Length .08 inch; cylindrical, even from 2 to 7, then tapering slightly to extremity; on 2 is a dorsal chitinous patch on which are six tubercles, three on either side the medio-dorsal line, each with black hair; below the patch two tubercles, one above, the other below spiracle; on segments 3 to 13 are two dorsal rows of large tubercles, one to the segment, on the anterior part of same, each with long curved hair, from 3 to 7 turned forwards, the rest recurved; next, a row of small tubercles from 3 to 13; on 3 and 4 these stand in vertical line with the dorsals, but on the other segments they are back of the line of dorsals; a third row from 5 to 13 of small tubercles, in vertical line with the dorsals, and on 2 to 4 these are continued a little below the line of the other segments; on 3 and 4 is a short row, in line with the spiracles, and a corresponding tubercle appears in 13; and below spiracles, from 5 to 13, on the posterior part of each segment, is a minute tubercle; finally, along base of body is a row of minute tubercles from 2 to 13, on 2, 3, 4 one to each segment, also on 13, but on the other segments two to each; from all these tubercles proceed hairs, those of basal row turned down, but of the others, from 2 to 7 turned forward, the rest recurved; color whitish-green; feet and legs green; head rounded, bilobed, the vertices rounded; color dark brown; many black hairs scattered over the surface, curving down. Duration of this stage 4 days in April, 2 days in July.

After 1st moult.—Length .13 inch; color either brown-black, or black with whitish lines at the junctions of the segments; armed with seven rows of branching spines (disposed as described under mature larva); these spines are short, stout, black, and beset with short divergent bristles; in the examples which have white lines, on segments 4, 6, 8, 10, the spines spring from whitish tubercles, on the other segments from black;

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in the black examples all tubercles are black; on 2 is a chitinous band with four small spines in cross row; besides the seven principal rows, there is a row of minute spines over legs and feet; feet black; legs olivaceous; head round, depressed at top, the vertices a little produced, each bearing a short, thick process, with short spines at top; color of head and processes dark brown; many black hairs over surface springing from fine tubercles. Duration of this stage 3 days in April, 2 in August.

After 2nd Moult.—Length .3 to .33 inch; same shape; color dark olive-brown or black-brown or reddish-brown, individuals varying; the spines longer, and at one-third from the top give off branches; the posterior end of each segment after 2 crossed by two or three fine white lines; in front of the medio-dorsal row of spines are two oblique divergent whitish bars, one such bar from base of each spine in 1st lateral row on outer side; the spines vary largely, some larvæ having all the spines black, some have the dorsal and 1st lateral rows on 5th, 7th, 9th segments white, the rest black; some have white from 4 to 11; some have white on 9 only; on 2 a collar of black simple spines; head broader than high, the top rather square, not much depressed, the processes larger, but similar to preceding stage, crowned with six points, one in middle, the rest about it; surface glossy black, with many simple spines, of different sizes, usually all black, but some examples show a few white among the black; each with long hair. To next moult, in May 3 days, in August 2 days or somewhat less.

After 3rd Moult.—Length .38 to .4 inch; color black, crossed on the posterior end of each segment with two or three lines or stripes of white, sometimes more or less macular; according to the breadth of these bands the larva is quite white or otherwise; the oblique marks on dorsum as before, more conspicuous; a yellow band runs along base in line with lower lateral spines, and the posterior part of each segment above this band shows an oblique bar, and some white spots and points; spiracles black in broad white rings; the spines long, and branching as before; the medio-dorsal row are always white; those of 1st lateral row are usually white, but sometimes on 3 are black, or partly black; some examples have the 2nd lateral row wholly black, others white, or some of the last spines are parti-colored; on 2 is a collar of simple white spines; head as before, the white spines predominating largely. To next moult in May 3 days, in August 2 days or somewhat less.

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After 4th Moult.—Length .8 inch; in three days reaches maturity.

MATURE LARVA.—Length 1 inch; cylindrical, stout; armed with seven rows of long, tapering spines, one medio-dorsal, and three on either side; the dorsals beginning at 5 and ending at 12, the upper laterals run from 3 to 12; the second laterals from 3 to 13, but on 4 the spine is below the row, and in line with the spiracles; the lower laterals from 5 to 12; from a little below the summit of each spine rise from three to five slender branches, about a central one which is a prolongation of the spine itself; the spines of the dorsal and upper lateral rows are largest and longest, and each has five branches, besides one or two lower down, of medium length, and some small spines, each branch and spine ending in a bristle; the spines of second lateral row are of medium length, with four branches; and those of the lower row are shortest and have three and four branches; in the green and white varieties of the larvæ all the spines are whitish or yellow, as well as the branches; in the black, the spines are yellow, mostly black-tipped, the branches as well, but the spines of the first lateral row are sometimes black to their bases; so those of second row are sometimes wholly, sometimes but partly black; 2 has a collar of six simple spines and two others are upon each side, in vertical line; the color of body varies much; some examples are cream-white, some greenish-white, with almost no markings, or the markings are obsolescent; others are velvet-black, the dorsum crossed by white stripes upon the posterior edges of the segments; with two white divergent bars coming to an angle at the front of each dorsal spine, and running to the anterior edge of the segment; and with a similar oblique bar from each spine of the first lateral row on the lower side; along the base is a raised yellow stripe, and from this up to the second laterals the ground is crossed by abbreviated white stripes or patches, particularly on the last half of the segments; above this the side is black; but individuals vary in the extent of this black area; sometimes the ground color is vinous-red; under side greenish, or honey-yellow, according to the color of upper side; the spiracles black in broad white rings; at the base of the second laterals from 9 to 11, or from 7 to 11, is usually a fulvous or orange patch, varying in extent; feet greenish or black; legs greenish or brown; head rather square, higher than broad, with high vertices; in the light examples the color of head is dull pink, in the dark ones it is black, shining, sometimes with a forked whitish stripe down the front; on each vertex a short, stout process, cylindrical, com-

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pressed in the middle, broad at the top, crowned by five equal, blunt-tipped spines around a sixth in the middle; each with hair; these processes are black in the black larvæ, and in the light ones either red or red with black tops; face and whole head thickly covered with simple white spines of variable length, all white, except that sometimes there are one or two of the longer ones on side face below the vertex which are black, or black and white; along back of head and down the sides is a row of these spines close set. From 4th moult to pupation 5 days.

CHRYSALIS.—Length .8 to .9 inch; greatest breadth .24 to .26 inch; cylindrical; head case high, compressed transversely; at each vertex a long, conical process; the mesonotum elevated, the carina very prominent, thin, nose-like, followed by a deep excavation; wing cases raised, flaring at base, compressed in middle, with a point on the margin; on the abdomen three rows of tubercles, those corresponding to the dorsal row of the larva small, to the first laterals large and conical, the pair in middle of the series particularly prominent, and those in the excavation silvered, gilded or bronzed, varying; color variable, many examples being dark brown, with lighter or with yellow-brown, and much reticulated with dark lines; others are dead-leaf brown; others are light, up to dead-white shaded slightly with yellow-brown, with a bronze lustre over the wing cases and anterior dorsal parts. Duration of this stage about 7 days.

Grapta *Comma* is found abundantly in New England and thence through the Northern States to Nebraska; also through Canada and in Nova Scotia; and to the South, at least as far as the Kanawha district of West Virginia. In the Northern States the species is two-brooded, in Kanawha three-brooded. It is seasonally dimorphic, the winter form being *Harrisii* (i. e., the form described by Dr. Harris), the summer form *Dryas*, Edw. Both these are figured in Butterflies of N. A., Vol. I. Where there are three broods, the middle one is made up of the two forms. Eggs laid by the hybernating females (form *Harrisii)* in April or May, give *Dryas* in May or June, and this is the first brood of the year. Eggs laid in July by *Dryas* give both forms in August—the second brood; and eggs laid in September by either form give *Harrisii* in October. The first eggs are laid in April or May, according to the forwardness of the season. In 1882, I obtained eggs from *Harrisii*, tied in bag over a hop spray, 14th April, and from 22nd to 25th May, had therefrom 35 *Dryas*, 17 ♂, 18 ♀. In 1874, the first eggs were obtained 10th May, and the result up to 27th

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June, was 34 *Dryas*. In 1875, the first eggs were 14th May, and up to 18th June these gave 19 *Dryas;* no *Harrisii* in either case. In 1869, on 18th June, one ♂ *Harrisii* came from chrysalis, the only instance known to me in which that form has appeared in the first brood. So that in different years, at Coalburgh, there is a variation of at least a month in the laying of eggs by the hybernators, and consequently a month's difference in the appearance of the first brood. In Can. Ent., X., p. 69, I gave the results of rearing the several broods up to end of 1877.

The larvæ, as described, are quite variable, when mature, the color of body being white, green or black; and the black examples vary much in the extent of the white or yellow markings. But neither color belongs especially to one form of the butterfly. Thus, of 50 larvæ, from eggs laid by *Harrisii*, in 1882, but one was white, the rest being black. Of 34 larvæ from eggs of *Harrisii*, in 1874, but 6 had black ground, and the rest were all light, several being cream-white. Of 23 larvæ from eggs of *Harrisii*, in 1875, 10 were white or greenish, 13 more or less black. Of 60 larvæ from eggs of *Dryas*, 1873, only one was white, the rest black. So that there is no apparent connection between the color of the caterpillar and the form of the butterfly.

The caterpillars feed on Hop, Nettle, false Nettle, (Boehmeria cylindrica,) and Elm. I have found them at Coalburgh almost always on Hop and Boehmeria. The eggs are laid either singly or in small clusters upon the under side of the tenderer leaves, and the young larva eats a hole for itself in the substance of the leaf, and during the first stage feeds about this. For the first two stages it is exposed on the leaf just as the larva of G. *Interrogationis* is, but at the second moult behaves differently from that species, which makes no shelter for itself at any time. I watched three larvæ of *Comma* in Aug., 1882, to learn exactly at what stage they began to protect themselves, placing them as soon as hatched upon a plant of Boehmeria set in flower-pot in my room. Very shortly after the second moult they had gotten to the bases of the third pair of leaves from top, two on one leaf, one on the other, and were engaged in drawing the edges of the leaves next base down with silk spun. To effect this they had bitten off the principal rib on either side the mid-rib, very near the edge of the leaf, and had cut quite to the edge. This leaf naturally curves the other way, so that the caterpillars were working at a disadvantage on the convex side. But notwithstanding this, they had, in course of an hour,

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bent down the edges and bound them together for one half inch. Next morning they all rested under their awnings, two under one, as at the first, and had fed off the tip end of the leaf. Twenty-four hours later the two larvæ had left what remained of their leaf, now scarcely longer than themselves, and each had betaken itself to another leaf. I had to transfer them to a larger plant, and next day found two under one leaf, again brought together as before. The other was upon the *upper side* of its leaf, and had closed that at the top. Still later this larva had drawn down the top of the plant and was concealed very nearly as much as the larva of Vanessa *Atalanta* is, which uses this same plant. Here it passed 4th moult. So that these larvæ can adapt themselves to circumstances, and cover themselves on the upper as well as the lower side of the leaf, if expedient. I noticed that at the older stages the ribs were not bitten, nor were the edges of the leaf slit, the larvæ being able to draw down the edges without that aid. When lying under the shelter the larvae are at the inmost part, and are coiled up much like figure 6. In nature I do not remember to have found more than one caterpillar under one leaf.

The nearest ally of G. *Comma* is G. *Satyrus* Edw., a species common in the Pacific States to Rocky Mts., and taken even in Ontario. Mr. T. L. Mead captured two examples some years ago, north of London, Ont. *Satyrus* is dimorphic, its other form being *Marsyas* Edw., and the larvae remarkably resemble those of *Comma* in color and markings. So they protect themselves in precisely same manner as do *Comma* larvae, and these are the only two American species of Grapta which have that habit, so far as known.

DESCRIPTION OF A NEW SPECIES OF LYCAENA, FROM NEWFOUNDLAND.

BY W. H. EDWARDS, COALBURGH, W. VA.

LYCAENA ASTER.

MALE.—Expands 1 inch.

Upper side purplish-blue, the costal margin of primaries silvery; both hind margins narrowly edged black; secondaries have a marginal series of black points or minute spots; fringes white.

Under side white; primaries have the hind margin edged by a fuscous line thickened at each nervule; a submarginal row of rounded black

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spots entirely across the wing, and parallel to the margin; a discal row of smaller spots in a curve from costa to lower median interspace, the next spot below out of and behind the line; on the arc a thick bar. Secondaries have an oblong, rounded, fuscous spot at the end of each nervule, but otherwise the edge is white; a submarginal series of metallic points, each of which is overlaid by orange, and above this a black crescent; a discal series of black points, following the costal margin from base, and running parallel with hind margin to lower median interspace, after which there are two spots back of the line; on arc a streak, a dot nearer base, and another below cell.

Body above blue, beneath white; legs white; palpi white with many black hairs in front; antennæ annulated black and white.

FEMALE.—Expands 1.1 inch.

Upper side fuscous, bluish over basal areas of each wing, and on secondaries, over the inner half the wing; secondaries have a marginal series of large rounded blackish spots, faint towards outer angle, each with a little fulvous on upper side. Under side pale fawn-color; marked as in the male, but all spots more conspicuous; and in addition, on primaries, the spots which in the male form the submarginal row, and stand alone, here are the crescents which overlie orange spots, and between these last and the margin is a series of black points. From 1 ♂, 1 ♀ (part of a considerable number) taken by Mr. T. L. Mead, in Southern Newfoundland. The species is near to the Californian species, L. *Anna*, Edw.

LIST OF THE SPECIES OF TRIPUDIA AND GYROS.

BY A. R. GROTE, A. M.

I have described the genus *Tripudia* in the Can. Ent., but the characters are not obvious until we know the neuration, which I am satisfied will give us distinguishing features from *Eustrotia* and *Thalpochares*. Compared with these the front is narrow and a little bulging; the vestiture is scaly, and there is a ridge of scales on the occiput. The lashless naked eyes, the slender unarmed tibiae agree with its allies. The wings are entire and there is a velvety band on the primaries, not legible, however, in two minute, pyralidiform species which may not be different, my

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flavofasciata and Mr. Edward's *versuta*. The species are only known to me as yet from single examples, and are from the South. *Limbata* has the hind wings orange; the rest fuscous or blackish, silky.

Tripudia Grote.

Type: *Erastria Quadrifera* Zell.

Quadrifera Zeller
Limbata Hy. Edw.
Opipara Hy. Edw.
Lixiva Grote.
Basicinerea Grote.
Flavofasciata Grote.
Versuta Hy. Edw.

Gyros Hy. Edw.

Type: *Oribates Muirii* Hy. Edw.

Muirii Hy. Edw.

TABLE OF SPECIES OF EUCHAETES.

BY A. R. GROTE.

The number of described species of this Arctian genus is increasing, and from my own collections in New York, I do not believe that our Eastern forms are at all well known. Among the most interesting recent discoveries in Arizona is *E. zonalis*, Grote, a form in which the abdomen is banded with crimson and black and unlike the other species in this respect. The following table may assist the identification of the species:

a. Wings with costa and internal margin of primaries striped.

1. Stripes crimson; wings dark. *Spragiei* Gr.
2. Stripes dark yellow; wings dark. *Abdominalis* Gr.
3. Stripes faint, yellow; wings pale. *Vivida* Gr.

b. Wings with costa only striped.

4. Stripe dark yellow; wings dark; abdomen banded. *Zonalis* Gr.
5. Stripe "pale luteous"; wings dark; abdomen spotted. *Eglenensis* Clem.
6. Costa yellow to apex; wings pale. *Collaris* Fitch.
7. Costa yellow one-third its length; wings pale. *Pudens* Hy. Ed

c. Wings unstriped.

8. Wings dark; abdomen yellow. *Egle* Drury.
9. Wings white; abdomen crimson. *Elegans* Stretch.
10. Wings dark; hind wings with crimson patch on hind margin. *Perlevis* Gr.

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Two species, *Inopinatus* Hy. Edw., and *Oregonensis* Stretch, I have not examined; the latter species I have been shown, without making any notes upon it, in different collections made in New York State.

The most unusual species is *Perlevis*, with its partly red secondaries, and which is smaller than the rest and somewhat narrow-winged. *Pudens* is a thinly scaled, whitish form, looking like, but slenderer than *Collaris*. A female specimen of *Spraguei* which I saw in Mr. Von Meske's collection, from Texas, had the stripes tinged with yellowish, not so purely crimson as in my male type from Kansas. *Zonalis*, *Spraguei*, *Elegans* and *Vivida* are, perhaps, the handsomest species in the genus and are not inferior in beauty, from the contrast offered by their colors, to the species of *Arctia*. The brilliantly tinted stripes and bodies are set off by the neutral tints of the wings. I have elsewhere drawn a parallel between this genus and *Ctenucha* in form and color, which is interesting; the metallic sheen of *Ctenucha* is wanting in these soft colored species of true *Arctiidæ*.

ARSILONCHE AND LEUCANIA.

BY JOHN B. SMITH, BROOKLYN, N. Y.

During the past two years I have found on the exchange lists of most northern, and all Canadian collectors with whom I have done any exchanging, *Arsilonche albovenosa* Goetze under its synonym *Ablepharon Henrici* Grt., and on their list of "wants" as uniformly appeared *Leucania phragmitidicola* Guen. I always sent for *Arsilonche*, and always received *Leucania phragmitidicola*. The latter is a common insect, but the former is more rare, and it may be interesting to know how the two can be distinguished. Superficially they are very much alike; generically they differ as follows: *Arsilonche* has *lashed* eyes, *Leucania* has them *hairy*; the tongue in *Arsilonche* is weak and short, in *Leucania* long and corneous; the legs in the former are shorter and more compact than in the latter, and the spurs of middle and posterior tibiæ are much shorter. The vestiture of *Arsilonche* on thorax and body is entirely hairy, fine and long; in *Leucania* the hair is somewhat flattened, more scale-like and shorter *Arsilonche* has also the head more retracted, the abdomen longer and the primaries rather more lanceolate. The secondaries in *albovenosa* are pure white, in *phragmitidicola* they are more smoky and have a darker border.

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The primaries in *albovenosa* are whitish with smoky lines; in *phragmitidicola* the ground color is a straw yellow, darker on costa, through the centre of the wing and just below the apex; the median vein is white, and in fact all the veins can be distinctly traced as fine white lines. At the end of the discal cell, almost on the median vein, there is a distinct black spot, and there is an oblique row of dark spots—often not very distinct—from the apex to the hinder margin. I have in one instance received a specimen of *L. Harveyi* Grt. as *albovenosa*, and several times *Harveyi* have reached me ticketed *phragmitidicola*. *L. Harveyi* is smaller, has the ground color of primaries paler, and while the pattern of markings is almost identical with *phragmitidicola*, it is readily distinguished from it by the much heavier, clearly defined dark markings, by having several distinct black dots in the discal cell, and by the want of white scales on the veins; the median vein is the only white one, and this is much more distinct than in *phragmitidicola*; the secondaries seem also much darker in *Harveyi*.

As to relative position in the family, *Arsilonche* stands near the head, before *Acronycta*, while *Leucania* (or *Heliophila* according to Mr. Grote) comes after the typical *Noctua* and nearer to *Orthosia* and its allies.

Mr. Grote, in his Catalogue, places *Arsilonche* just before *Leucania*, but it seems much nearer to *Acronycta*, and I consider the place Lederer gave the genus when he described it as more appropriate.

NOTES ON A GALL MITE OF THE NETTLE TREE
(*Celtis occidentalis.*)

BY REV. T. W. FYLES, COWANSVILLE, P. Q.

GALL, formed on the under side of the leaf, pear-shaped, half an inch long, forms a cup-like indentation on the upper surface. I have counted eighteen galls on one leaf. One mite in a gall.

MITE, one-tenth of an inch long. Eyes large and protuberant, light red. Antennæ moniliform, ten-jointed—the basal joint and that next it being much larger than the rest. Proboscis for suction. Four undeveloped wings—mere protuberances in the case of some (probably younger) specimens—generally translucent, but in some instances smoky brown. Legs, six in number, hairy, semi-transparent. Abdomen much enlarged, top-

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shaped, the three last segments reddish brown. Tuft of terminal spines of the same color. The creature has a gelatinous appearance; and this, together with its agitation when disturbed, reminds one of Young Blight's description of Old Dolls: "All a-shaking like glue monge." It attains its growth in August and becomes quiescent.

THE PERFECT INSECT makes its appearance in September. To allow its egress the pupa-skin is ruptured from the head to a point beyond the base of the wing-covers. Its appearance is that of a very minute Cicada. Colors light at first, but darkening with exposure. Eyes large, madder-brown in a lighter setting. The facets very distinct, giving the eye a granulated appearance. Three ocelli, like small rubies, one above each compound eye, and one between the plates of the face just above the palpi. Antennæ moniliform, two large and eight smaller joints, as in the mite. Thorax, dark brown above with longitudinal bands of lighter color, amber-colored beneath, mottled with dark brown. Six powerful legs covered with short bristly hairs; femur much stouter than tibia, and more darkly colored; tarsus two-jointed. Upper wings large and full, pearl-grey, thickly peppered with black—the peppering leaving a band, towards the lower end, clear. The nervures are brownish amber. Under wings of finer texture, and with no black spots, but in some lights beautifully iridescent; have three nervures, the inmost indented. The insect is quick in its motions, making a sudden spring like the Frog-hopper.

EARLY STAGES OF FIDONIA NOTATARIA, WALK.

BY L. W. GOODELL, AMHERST, MASS.

EGGS.—Oblong, covered with hexagonal depressions and bright green in color. Length 0.6 mil.; width 0.3 mil. Duration of egg stage 12 days.

YOUNG LARVA.—Length 2 mil.; head twice as wide as the body, round and deep ochre yellow; body dull yellowish green with a faint paler stigmatal stripe.

MATURE LARVA.—Body of uniform thickness, deep green with a narrow sub-dorsal and stigmatal white stripe, and a dorsal greenish-white hair line; dorsal space pale green; ventral space yellowish green. Head brownish green with a lateral white stripe which is a continuation of the sub-dorsal stripe of the body. Length at rest 25 to 26 mil.; when crawl-

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ing, 26 to 27 mil. Food plant, *Pinus strobus.* Duration of larva stage, 35 to 40 days. Described from 57 specimens.

PUPA.—Length 9 to 11 mil.; color brown, the spaces between the segments and a dorsal line darker; wings dark green; subterranean.

CORRESPONDENCE.

DEAR SIR: In a recent number of the CAN. ENT., Mr. Reed speaks of *Tityrus* Skipper as scarce about London. Here it is one of our most abundant species, and its larva can be found on the locust trees at almost any time throughout the summer. But this fall I found great numbers of them feeding on a wild trailing vine, in all stages of their growth; this vine may have been their native food plant before they had the locust to feed upon.* Mr. Reed also mentions having found *Clytus pictus.* It is no doubt *Clytus* or *Cyllene robinia* that he refers to, *pictus* being the Hickory *Clytus*, and only found in the spring of the year. There is a good deal of confusion existing about these species, some even questioning if there are two. It is undoubtedly *robinia* that Harris describes under the name of *pictus.* Whether both species were discovered at that time I know not, but Walsh is reported by Packard to have said that the male of *robinia* differs from *pictus* in having much larger and stouter antennæ, and in having its body tapered behind to a blunt point, while the female is not distinguishable at all. With 18 specimens of *pictus* before me, captured between the 17th and 21st of May, 1879, on hickory cord-wood cut the previous winter, and a large number of *robinia*, I note the following differences: In *pictus* the body is uniformly more slender and tapers more behind than *robinia.* In *pictus* the antennæ is decidedly longer, that of the females reaching to the end of the body, and that of the males beyond. The third or W-band on the wing covers is noticeably more delicate than in *robinia*, and quite white in contrast to the yellow of the other's markings, a characteristic I have never seen in any *robinia* I ever met with (and I see them here in hundreds every fall feeding on the Golden-rod), and one which would of itself make it quite easy to pick out my *pictus*, male or female, from amongst any quantity of *robinia* they might be mixed with.

J. ALSTON MOFFAT, Hamilton, Ont.

*This vine, a sample of which was sent by Mr. Moffat, is *Lathyrus paluster L.*, known under the common name of "The Marsh Vetchling."—[Ed. C. E.

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DESCRIPTION OF THE PREPARATORY STAGES OF GRAPTA INTERROGATIONIS, Fab.

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg.—Conoidal, the base flattened and rounded; marked by 8 or 9 vertical ribs, which near the base are low, but on upper third are considerably elevated, increase gradually in prominence and terminate abruptly around a small flat space at summit; these ribs are thin and their sides are grooved perpendicular to the surface of the egg; color pale green. Duration of this stage from 3 to 4 days in summer, in April and early May 10 days.

Young Larva.—Length 24 hours from egg .1 inch; precisely like *Comma* at same stage; cylindrical, even from 2 to 7, then tapering slightly to extremity; on 2 is a chitinous dorsal patch on which are six tubercles, three on either side the medio-dorsal line, each with black hair; below are two tubercles on either side; on 3 to 13 are two dorsal rows of large tubercles, one to each segment, on the anterior part of same, each with long curved hair, from 3 to 7 turned forwards, the rest back; next, a row of small tubercles from 3 to 13; on 3 and 4, these stand under the dorsals, but on the other segments they are behind the line; a third row of small tubercles from 5 to 13, under the dorsals, and on 2 to 4 is an extension of this row below the line of the other segments; on 3 and 4 is a short row, in line with the spiracles, and a corresponding tubercle appears on 13; below spiracles, on the posterior part of each segment from 5 to 13, is a minute tubercle; and finally, along base of body is a row of minute ones from 2 to 13, on 2 to 4 one to each segment, also on 13, but on the other segments, two to each; from all these proceed hairs, those of the basal row depressed, but of the other rows, from 2 to 7 they are turned forward, the rest back; color at first whitish-yellow, semi-translucent, and some examples have the dorsum crossed by brownish patches alternating with the yellow; as the stage proceeds the body becomes red-brown, with white on dorsum of segments 4, 6, 8, 10, with variation in

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this respect; head rounded; color shining black; many black hairs scattered over the face curving downward. Duration of this stage 3 days in May, 2 in summer.

After 1st Moult.—Length .14 inch soon after the moult, in 24 hours .20 inch; slender, even; color red-brown, with indistinct whitish lines; of these, a wavy line runs with second laterals; from base of each first lateral is an oblique line outward to the front of the segment, and from each dorsal are two such lines, one on either side; armed with seven rows of spines, one dorsal, and three on either side, disposed as in *Comma;* these are short, stout, black, beset at top with short branches, with some shorter spines on the sides, each ending in a black bristle; as the larva approaches second moult, the bases of the dorsal and 1st lateral spines become white or yellow, or reddish-yellow, while the color becomes more red, and the lines become more distinct; on 2 is a dorsal transverse row of 4 short, simple spines; legs and feet dark brown; head rounded, depressed at top, the vertices a little produced, each bearing a stout, thick, black process, with conical spine at top, and shorter ones around the base of this; color black, with many black hairs. Duration of this stage from 2 to 3 days.

After 2nd Moult.—Length .24 inch; color black, the lines as before, with the addition of one running with lower laterals, more distinct, often macular; spines as before, but variable in color; in some examples, all are black except the dorsals and 1st laterals on 4, 6, 8, 10, where they are reddish-yellow; some have the spines on these rows light, except on 9, 11 and 12; usually the second laterals are black and the lower row is pale yellow; in all cases the tips are black; as the stage proceeds the color of body changes to olive-brown, and the lines become more conspicuous; head as before, much covered with white simple spines. Duration of this stage from 2 to 3 days.

After 3rd Moult.—Length .5 inch; color black, with cream-white lines, quite macular; spines very variable; some examples have every spine of the upper five rows reddish to reddish-yellow, the lower laterals pale yellow; some have the dorsals and 1st laterals from 3 to 11 red, the rest and all of second laterals black; some have the body color vinous instead of black, with no black spines, the upper rows very red anteriorly, the lower laterals yellow; the lines yellow; head either deep brown-red, or decided red in the vinous larvae, the processes red, with spines both

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red and black; the spines on face yellow or white. Duration of this stage 2 to 3 days.

After 4th Moult.—Length .9 inch; color deep black, the spines often very red, from deep red bases; the surface much covered with tubercles, from small to minute, which are partly white, partly yellow, with many red; the lines red, or red and yellow. In 2 to 3 days becomes full-grown.

MATURE LARVA.—Length 1.3 to 1.5 inch; cylindrical, stout; color dull black, with white and yellow and red tubercles on the cross ridges; and longitudinal lines and bands of red and yellow, varying greatly in distinctness; when most distinct, there is a band along the basal ridge; a stripe running with second laterals, an oblique line from base of each first lateral outwards to the front of the segment, and one from front on either side of dorsals also to front of the segment; when the lines are obsolescent, the yellow and red tubercles quite cover the surface; under side black-brown; spines in seven rows, one dorsal, three on either side, disposed as in *Comma;* long, slender, tapering, with several branches at top, one being a continuation of the spine, the others arranged about its base somewhat irregularly; these are of about equal length in the several rows, and others, which are shorter, are found on the sides of the spines, and are particularly numerous on the upper rows of the anterior segments; the dorsals have 5 main branches, the 1st laterals 6, the 2nd and lower laterals 4 and 5; in most examples the dorsals and 1st laterals are red, except on 3, where they are red with black bases, and on 11 and 12, where they are usually black, the red being deepest on anterior segments; the second laterals are sometimes all red, and the lower row is always yellow; over the feet from 2 to 10 is a simple red spine; on 2 is a dorsal row of six simple black spines; spiracles conspicuous, black in white rings; head obovoid, rather flattened, deeply cleft, the vertices high, and each bearing a stout and short black process, ending in a long spur, with five others about its base, each hair-tipped; the face covered with simple spines and tubercles, some minute; on each side below vertex are four long spines, black, the rest are mostly white, each with hair; color either deep red-brown, or red, about the ocelli a large black patch. From 4th moult to pupation, 5 to 6 days.

Chrysalis.—Length 1 inch, greatest breadth .3 to .32 inch; cylindrical; head case high, compressed transversely, at each vertex a long, conical process; mesonotum elevated, the carina very prominent, thin, nose-like, more rounded on the anterior side than in *Comma*, followed by a deep

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excavation; wing cases raised, flaring at base, compressed in middle, with a prominent point on the margin on dorsal side; on the abdomen three rows of tubercles, those corresponding to the dorsal row of the larva minute, to the first laterals large and conical, the pair on middle of the series particularly prominent; those in the excavation gilded; color variable, in shades of brown from light yellow to dark, often clouded with olivaceous or lilac; sometimes a dark green stripe on the side of abdomen below wing cases. Duration of this stage from 7 to 11 days, according to the weather.

Grapta *Interrogationis* is found over the entire United States, except on the Pacific slope, flying from Arizona to Montana and through Canada to Nova Scotia. In the northern States, and probably in Canada, it is two-brooded, but in West Virginia there are three broods, and a more or less successful effort for a fourth, depending on the weather late in the fall. In Florida there are at least four broods, and probably five. At Coalburgh, eggs laid by hybernating females give butterflies last of May. This is the first brood of the season. Eggs laid early in June give butterflies early in July—the second brood. Eggs laid last of July give butterflies in September—the third brood. Eggs laid through September give butterflies in October. Individuals of each brood are emerging for some weeks, say for a month, so that the earlier females may be laying eggs while the later members of the same brood are coming from chrysalis. But in case of the fourth brood, it often can be only the earliest hatched larvae which produce butterflies, because by 1st October we are apt to have frost and cold weather, and the food is thereby destroyed. But in some seasons frost holds off till late in the fall, and then the greater part of the larvae might reach chrysalis. As stated in Can. Ent., x., p. 72, I think it probable that the butterflies of the third brood do not hybernate, but that the continuance of the species depends on the individuals of the fourth brood, usually but few in number. This would account for the species being so rare in this district late in the fall and early in spring as compared with *Comma*, which has no fourth brood. The *Comma* butterflies of the third brood are the hybernators, and are to be seen in multitudes before winter, or in November. Whereas *Interrogationis* then is rarely seen. And yet in midsummer it is as common as is the other species.

Interrogationis is a seasonally dimorphic species, the two forms being also very distinct in both shape and coloration. They are figured in Butterflies of N. A., Vol. 1. The hybernating form is *Fabricii*, but in one

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instance, and one only, I have seen an *Umbrosa* early in the year, which must have hybernated. The only hybernating female I have been able to breed from was *Fabricii*, from which I got eggs, 28th April, 1877. The result on and just before 4th June was 21 butterflies, all *Umbrosa*, the first brood of the year. Eggs laid by the females of *Umbrosa* of the first brood have repeatedly produced a mixed brood—the 2nd of the year—but with a majority of individuals *Umbrosa*, as :

11	*Umbrosa*	to	6	*Fabricii*
26	"	"	no	"
19	"	"	no	"
1	"	"	2	"
14	"	"	no	"
38	"	"	16	"
12	"	"	no	"

Total, 121 *Umbrosa*, 24 *Fabricii.*

Eggs laid by the females *Umbrosa* of the 2nd brood have produced a mixed brood, the 3rd of the year, with a larger proportion of *Fabricii*, as :

63	*Umbrosa*	to	34	*Fabricii*
2	"	"	9	"
1	"	"	20	"
1	"	"	5	"
46	"	"	6	"
21	"	"	no	"
Larvae found—65	"	"	4	"
6	"	"	16	"

Total, 205 *Umbrosa* to 94 *Fabricii.*

So that while in the 2nd brood *Umbrosa* has had 80 per cent. of the whole product, in the 3rd brood the same form has had but 60 per cent.

Eggs laid by *Umbrosa* of the 3rd brood have produced *Fabricii* only, the 4th brood, as :

	No	*Umbrosa*,	25	*Fabricii.*
Larvae found—	No	"	10	"
	No	"	4	"
	No	"	2	"
	No	"	25	"

Also I have recorded in October that no form has been seen by me but *Fabricii*, that many were about, coming to apples in the orchard.

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The last brood in Florida, if I may judge by 25 *Fabricii* which emerged from chrysalis, at Coalburgh, in November, 1880, the larvae received from Indian River, as before related, would be all *Fabricii*. It would seem therefore that the species is strictly seasonally dimorphic, the last brood producing *Fabricii*, the hybernating females producing *Umbrosa*, but the intervening broods, like the second brood of *Comma*, producing both forms, but with a majority of individuals *Umbrosa*, or the summer form. This is what might have been expected, when the species became polygoneutic, as the interpolated broods are summer broods. The winter brood holds its own, the summer broods after the first, or original one, are made up of both forms.

In the case of the single *Umbrosa* seen in early spring, of which I have spoken, this may have been an exceptional member of the 4th brood, or a hybernating member of the 3rd.

The larvae, as before described, are very variable. That is, they also are polymorphic, and they may readily be separated into 3 or 4 distinct types, as thus :

1. Body black, finely specked with yellow ; no longitudinal lines on dorsum or upper part of side.
2. Body black, with small spots in place of the specks or dots, the longitudinal lines more or less conspicuous, and either yellow or red, or mixed.
3. Body russet, much covered with yellow spots, giving a pepper and salt appearance, the lines often obsolete.

There are intermediate variations, and there is a great variety in the color of the spines, from deep red and red bases, to yellow, or mixed.

The larvae from Florida were of one of these types only, No. 2, and especially were there none of the russet variety.

The food plants of *Interrogationis* are Hop, Nettle, False Nettle, (Boehmeria cylindrica,) Elm, Celtis, and in W. Va. they may be found on all these plants at the same season of the year. But the preference is for Hop and Elm, the first early in the season, the other in August and September. I have near my house many Elm sprouts which are cut down every year, to be replaced in a few weeks by a fresh growth. It is on the tender terminal leaves of these that the female chooses to lay her eggs, either singly or in strings of from 2 to 5 or 6, on the under side of the leaf usually. The egg is not correctly represented in But. N. A., although copied from a drawing made by so good an artist as Mr. Konopicky. It

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is too round, and perhaps the example sent for drawing was altered by the alcohol in which it was immersed. The egg really is like that of *Comma* figured on Plate of *Dryas*. The number of ribs varies from 8 to 10. Where a string of eggs is laid, the number of ribs is same in all. It is almost needless to say that the young larvae do not consume their egg shells. A lady correspondent says: "The Graptas scramble through their scuttles in headlong haste, totally regardless as to who may take possession of their late tenements, leaving whole hamlets to prove their presence in the vicinity." The larva attacks the leaf, eating a hole through it, each for itself, and during the first stages feeds about the margin of this hole. During all stages it lives unprotected, except as it lies under the leaf, in contrast with the habit of *Comma*, which after 2nd moult draws the edges of a leaf together at base and finds concealment beneath the awning thus made.

PREPARATORY STAGES OF AGROTIS ANNEXA, Tr.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter .03 inch. Shape globular, the base rather broad, the sides ribbed longitudinally, 12 of these ridges which reach the apex alternating with twice as many more of different lengths. The ridges are connected by slender cross bars, the transverse sides of the included spaces being longer than the longitudinal. The small apical space is punctured. Color white. Duration of this period, 4 days.

Young Larva.—Length .07 of an inch. Color pale grayish-white, a little pinkish on the anterior part. Head and top of joint 1 black. Piliferous spots small, black, the gray hairs arising from each a little longer than the diameter of the body. Legs 16, but the first and second pairs of abdominal, short so that the middle of the body is arched a little in walking. After eating the color of the body is pale grayish green. The piliferous spots, or at least the thoracic, in a single transverse row to each joint. Duration of this period, 8 days.

After 1st Moult.—Length .17 inch. Head brown, the clypeus paler. Color of the body about the same as before, with slight traces of dorsal, sub-dorsal and stigmatal lines, all pale. The piliferous spots regularly arranged, except on the first three joints, where they are in a single transverse row to each joint. Top of joint 1 a little brownish. Legs about as before. Duration of this period, 5 days.

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After 2nd Moult.—Length .35 inch. Color pale green with a slight brownish tinge, the dorsal, sub-dorsal and stigmatal lines without this tinge. Piliferous spots as before in position and color, a black hair from each. There is a dark oblique shade on the dorsum through the piliferous spots a little above the sub-dorsal line. Head brown, pale above the mouth; joint 1 a little yellowish above with four spots and hairs in front of the regular row. Duration of this period, 3 to 4 days.

After 3rd Moult.—Length .55 inch. Color of the dorsum drab with a narrow dorsal line a little more distinct than the rest, the dorsal space finely mottled with dull green, the dark shade along the piliferous spots about the same as in the last period. Sides dull green mottled with drab or pale ochre. Sub-dorsal line moderately distinct, the sub-stigmatal line a series of elongate, somewhat lunate spots. The lower half of the sub-dorsal space paler than the upper half. Piliferous spots as before. Head very pale brownish except the upper half of the cheeks, which are brownish black; jaws and ocelli dark brown. Duration of this period, 3 days.

After 4th Moult.—Length .75 inch. Color of dorsum yellowish drab, a whitish dorsal line bordered each side with a blackish line not very distinct. The oblique blackish shade along the course of the piliferous spots is prominent, reaching the border to the dorsal line. Sides grayish green the merest trace of a sub-dorsal line on some of the anterior joints, The region of the sub-stigmatal line yellowish green instead of grayish. Stigmata black, the space in the immediate vicinity of each a little yellowish. Venter and sub-stigmatal space green. Piliferous spots as in the last period. Head of nearly a nankeen color, the front of the cheeks dark brown, the sides mottled. Top of joint 1 brownish. Duration of this period, 5 days.

After 5th Moult.—Length from .90 to 1.00 inch. Color above to near the stigmata greasy blackish gray, with a yellowish drab oblique mark on each joint outside the dorsal piliferous spots, each mark broadest posteriorly and mottled a little with the ground color. On some there is no trace of dorsal and sub-dorsal lines, except on the cervical shield. Sub-stigmatal line pale gray, faintly yellowish. Venter pale greenish gray. Head pale greenish gray, slightly brownish on some, more or less dark brown on the cheeks, this mottled outside.

Mature Larva.—Length 1.35 inches, width of head .10 inch, of middle of body .20 inch. As the time of pupating approaches the colors are

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more blended and of a dark greasy gray, though the general marks are the same as at the first of the period. Duration of this period, 12 days.

Chrysalis.—Length .65 inch, length of wing cases from anterior end .39 inch, of leg and antennæ cases .40 inch, the latter reaching a little beyond the hind margin of joint 5 of the abdomen. Depth of thorax .18 inch, of abdominal joint 1, .18 inch, of joint 3, .19 inch, showing the chrysalis to be about cylindrical. Anterior part rounded down to the front of the head. The tip of anal joint ending in two short conical points. General surface smooth and shining, but the anterior edge of the dorsal part of joints 5 to 8 very much roughened. Color rather pale brown, the following parts dark brown: eyes, humeri, stigmata, tip of anal joint and the dorsal anterior part of joints 5 to 8. Duration of this period from 25 to 46 days.

About the first of August, 1882, the moth from which the eggs upon which my observations were taken, was captured, and the eggs were deposited August 3rd. The egg and larval history covered a period of 40 days, and the pupal was from 25 to 46 days more, making in round numbers from 2 to 3 months from the egg to moth. I do not know the number of eggs that were obtained, or larvæ resulting, but 39 completed all their transformations, having pupal periods as follows:

6	a period of	25	days.
10	"	26	"
9	"	27	"
3	"	28	"
2	"	29	"
3	"	30	"
3	"	32	"
2	"	44	"
1	"	46	"

The last were probably prolonged by the days and nights becoming for a time colder. This will give us two broods at least in a season. I am not sure of the way they pass the winter, though from the moths coming out in October, it is probable that they hibernate here as part grown larvæ, though it may be different further north. Their habits are truly "cut-worm," eating almost anything offered them, and hiding in the dirt during the day time. They were fed for the most part on Knot-grass (*Polygonum aviculare*). A few were kept in a glass dish partly filled with

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moist dirt, and as they went down in the dirt by the side of the dish to pupate, I could see that the dirt of which the cocoon was made was mixed with web.

NEW TABANIDÆ.

BY JOHN MARTEN, CARBONDALE, ILL.

Sub-genus Therisplectes.—"Eyes pubescent; ocelligerous tubercle more or less distinct; eyes (female) with three or four bright green or bluish cross-bands."

T. Californicus, n. sp. Length 17 mm. Eyes pubescent, with thin purplish bands. Front yellowish-gray; callosity nearly square, brownish, shining, prolonged above; ocelligerous tubercles brownish-black on a black spot. Face and cheeks grayish with white hairs. Palpi yellowish-white with small black hairs, Antennæ reddish; annulate portion of third joint black; upper angle prominent. Thorax grayish-brown with the usual gray stripes and golden yellow pubescence; humerus reddish; pleura and pectus grayish with long white hairs. Abdomen brownish-black, sides of first four segments brownish-yellow, which color leaves a row of black irregular spots in the middle, largest on the second segment and smallest on the third; also dark oblique spots on lateral margins. Venter yellowish with yellow pubescence; darker on the last three segments. Femora black, brownish at the tip; front tibiæ dark brown, proximal end lighter; second and third tibiæ darker toward the tip; tarsi dark brown. Wings hyaline; costal cell light brown; faint clouds in cross-veins and bifurcation of third vein.

Described from one female from California.

T. hæmaphorus, n. sp. Length 16 to 18 mm. Front brownish-gray; callosity black, shining, prolonged in a spindle-shaped line above; ocelligerous tubercle black on a brownish-black spot. Face and cheeks yellowish-gray with gray hairs. Palpi yellowish-white with minute black hairs. Antennæ black, faintly reddish on second joint and base of third joint; third joint but little excised. Thorax grayish-black with distinct gray lines and whitish hairs; humerus reddish; pleura and pectus gray with long dirty gray hairs. Abdomen with broad median band and last three segments brownish-black, sides of other segments fulvous with faint black-

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ish spots on lateral margins; a row of grayish triangles on the median band, most distinct on the second segment. Venter fulvous with light hairs, darker towards the tip, and first and second segments more or less dark. Femora black, brownish at the tips; anterior pair entirely black. Tibiæ dark brownish, the anterior pair black at the tip. Tarsi blackish-brown, anterior ones black. Wings sub-hyaline; costal vein slightly brownish, faint clouds on cross-veins and bifurcation of third vein.

Described from two females from California.

T. captonis, n. sp. Length 14 mm. Eyes pubescent, with three purplish cross-bands. Front narrowed anteriorly, yellowish-gray, with black hairs; callosity large, chestnut-brown, shining, prolonged above; sub-callus denuded, shining; ocelligerous tubercle dark brown, almost black, and surrounded with black. Face and cheeks gray with white hairs. Palpi yellowish with minute black hairs. Antennæ reddish, annulate portion of third joint black, angle not projecting much. Thorax brownish-black with whitish and yellowish pubescence; humerus reddish-brown; pleura and pectus grayish with white hairs. Abdomen yellow on the sides of segments one to four; a dorsal band and last three segments black; hind margins of segments yellow fringed with golden yellow hairs; venter yellowish with middle of segment one and the tips blackish. Femora black, brownish at tip; first pair of tibiæ black with proximate end brownish; middle and posterior tibiae brownish with black hairs, darker toward tip; tarsi dark brown. Wings hyaline, costal cell yellowish. Female from California.

T. centron, n. sp.—Length 16 mm.

Female. Habitat Colorado.

Eyes pubescent. Front narrow gray; callosity black shining, a detached, spindle-shaped line above; sub-callus denuded, shining; ocelligerous tubercle blackish Antennae black, slightly red at base of third joint. Face and cheeks gray with gray hairs. Palpi yellowish. Thorax black with dingy black hairs and five gray lines. Pleura and pectus black with gray pollen and hairs. Abdomen brownish-black; a row of equilateral triangles on the middle and oblique triangles on each side of the first four segments; hind margins fringed with whitish hairs. Venter fulvous with black on first segment, lateral margins and last four segments. Wings hyaline; costal cell yellowish-brown, and very faint clouds on cross-veins

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and bifurcation of third vein. Femurs grayish-black; tibiae brown, darker on distal ends; a fringe of black hairs on outer margins of the second and third pairs; tarsi brownish-black.

NEW SPECIES AND NOTES ON STRUCTURE OF MOTHS AND GENERA.

BY A. R. GROTE, A. M.

The veins of the wings in the moths are usually considered to fall into four main branches. I would, however, consider them to afford only two series; vein 1 of the German Entomologists belonging to the median series, and vein 12 to the sub-costal series of venules. In describing the neuration of *Euherrichia* (= *Herrichia* Grote non Staudinger) I have accidentally written "sub-median" for "median." Generic characters in the *Noctuidæ* are offered by the disposition of veins 6 to 9 on the fore wings and of the median series on the hind wings, from which vein 5 is sometimes *(Spragueia)* absent. In addition there is the presence of an accessory cell to be noted on primaries, which is caused by the peculiar position and course of the subcostal series of venules.

Genus CONSERVULA Grote.

It is surely not necessary to go over the entire structure in the diagnoses of related genera; the record of a single distinguishing structural feature should suffice. I have, however, usually recapitulated the characters; in the present case the entire primaries and even external or hind margin distinguishes *Conservula* from *Brotolomia* Led. and *Trigonophora* Led., ex. Hubn. In Lederer's monographic work several genera are partially but sufficiently characterized. I have followed so excellent an authority in considering secondary sexual characters (e. g. as in *Thecophora*) of generic value. In *Conservula* the body vestiture is less hairy and shorter than in *Euplexia*, which the species approaches in size. While Walker and Guenée do not usually give the structure of eyes and feet, Ochsenheimer, whose genera are all accepted, gives, as I have shown, no characters at all. Hubner's phrases are usually unsatisfactory, though his genera are sometimes good and always remarkable considering his times. In a monograph all the characters should be gone over, but in descriptional work the main object is to make the insect recognizable and to spare words. I

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am not aware of any test by which it shall be decided that a genus is sufficiently characterized. When the species is already known, less words are, I should think, needed. It is better to supplement missing characters in a diagnosis, than to needlessly criticize its author, especially in the case where a good number of genera have been fully and clearly made out by him and his work is largely of a pioneer kind, and often has to be accomplished with borrowed specimens or single examples. The difficulty of being always right is shown by Mr. Smith in putting *Polenta* among genera with unarmed tibiæ, while, *per contra*, I wrongly stated as it appears (though hesitatingly) that *Feralia* had no ocelli. There is room for careful work in the *Noctuidæ*, but the species must be fully examined as I have tried to do in the genera allied to *Erotyla*. A good lens, a good or perfect male specimen and a duplicate for dissection, a quick eye and experience are needed. If, with all these, patience and courtesy are possessed by the author, who must also know the literature well, satisfactory work cannot fail to be accomplished. Even with all these the student will be disappointed if he expects to produce a "Synopsis" that shall be correct and complete, in a short time. We probably shall have to classify nearly 2,000 kinds of *Noctuidæ*; I have examined or described about 1,200.

Genus PLATYSAMIA Grote.

Hubner's genus *Samia*, erected in the Verzeichniss for species incorrectly associated, and with a diagnosis devoid of characters of value, is used by anti-Hubnerists instead of *Platysamia*, a term fully explained and correctly limited by me to the three or four species, *Cecropia*, *Gloveri*, *Columbia* and *Ceanothi*. Upon what ground this is excused does not appear. It is not consistent; and can only be done by those who give to Hubner's genera the same value as those of scientific writers. Even in this case the procedure is doubtfully defensible. In using Hubner's genera I have been often guided by the prior use of the rejected term, *i. e.* in preferring *Lithophane* to *Xylina*, *Eustrotia* for *Erastria*, etc., both *Xylina* and *Erastria* being previously proposed by Hubner for different genera from those to which Treitschke and Ochsenheimer gave the terms. The entire question of Hubner's genera has been treated in a personal way, and every attempt I have made to compromise the matter has been met by unnecessary insistence on unimportant points. As it stands now, and taking the "Brooklyn List" as an example, Hubner seems only to be

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used where his names overthrow a genus proposed or adopted by myself. Mis-statements are made to sustain this view, as, for instance, when *Cressonia* is made synonymous with *Polyptichus*, whereas we originally showed that *Juglandis* was cited by Hubner with a number of species not properly associated with it, and no name had yet been used for one species which is unique as to structure and has no congener; Mr. Strecker's *Pallens* being based on the pale female variety, and Mr. Butler's *Robinsonii* being only large specimens of our somewhat variable and most interesting insect, first described by Abbot and Smith.

Genus PSEUDÒHAZIS G. & R.

Mr. Henry Edwards, who has made many interesting observations of the larvae of Californian moths, informs me that he knows the larvae of both *Eglanterina* and *Hera* (= *Pica*), and that they are unquestionably different. The synonymy adopted in my "New Check List" is taken from an article of mine published some years ago in the CANADIAN ENTOMOLOGIST. Doubleday's specimen, described by Harris, is presumably the same as that deposited by him in the British Museum and made afterwards the type of *Pica*. Audubon's figures have no real bearing on the synonymy of the two forms.

Genus EULEUCOPHAEUS Pack.

Eyes naked; clypeus moderately broad, with coarse dependant vestiture. Male antennae pectinate to the tips, median vein three branched. Wings entire. Forewings pointed at tips; outer margin even. I cannot separate *Tricolor* generically from *Yavapai* and *Maia*. We may follow Dr. Packard and regard the insect as a faded species, owing its color to its peculiar environment, but it is a faded *Hemileuca*. The type of *Maia* and *Nevadensis* departs too little to consider it different; the head is imperceptibly more sunken, the naked eyes almost lost under the dependant vestiture. The pattern of *Tricolor* essentially agrees with that of *Yavapai*. I should therefore consider *Tricolor*, *Yavapai*, *Juno*, *Diana*, *Grotei*, *Nevadensis* and *Maia* congeneric and refer them all to *Hemileuca*. After carefully examining the satiny white *Leucophaeus Neumoegeni* Hy. Edw., one of our most beautiful Bombyces, I find that the head is freer, more prominent than in *Hemileuca*, the front a little narrower, the vestiture shorter and not so overhanging. The male antennae are provided with shorter pectinations. They are in both sexes testaceous, while in *Tricolor* they are brown-black as in the other *Hemileucae*. The pattern of ornamentation

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is different. We have here a common extra-mesial black line, and the appearance is more Saturnia-like. There are two spots on the cell of fore-wings, while in *Hemileuca* we have only one. These characters are sufficient for at least a subgeneric division, and I propose to call it ARGYRAUGES, from the sheeny white wings. While in *Hemileuca* the colors are dull, in *Argyrauges* the fore wings especially are glossy and the colors bright. In *Argyrauges* the wings seem a little broader and fuller, but they hardly differ from *Maia* in this respect. The squamation of the wings is of a different character. The neuration, so far as I can observe it without denuding the wings, seems essentially the same in all these forms. There is a tendency in *Maia* and *Nevadensis* to vary in a different direction from the other forms. So far as I recollect, Dr. Hopffer's male and female types from Texas, in the Imperial Museum at Berlin, his *H. Grotei*, is more like *Maia*, though opaque, than the type of *Yavapai*. It was the first of the species, allied to *Maia*, to be described. While *Nevadensis* seems to be hardly more than a variety of *Maia*, I have never seen either *Juno* or *Diana*, but, from information, it seems likely that they are the same. Is *Diana* not the same as *Grotei*?

HYPERCHIRIA ZEPHYRIA Grote.

♀. Fore wings blackish fuscous, very dark, with an even white stripe from apex to middle of inner margin. Hind wings bright yellow in the disk with a large ocellus like *Io*; the yellow field is confined by an outer black line; terminal field pale fuscous shaded. Size of *H. Pamina* or a little larger, allied to it by the pale fawn abdomen shaded broadly above with red. The male differs by the abdomen all red above. The base of secondaries show longer pink red hairs. Beneath discolorous fuscous, with white discal dots surrounded by black on primaries. Thorax fuscous; marked where the wing touches the sides with white. New Mexico. Prof. F. H. Snow.

This is a notable addition to North American Bombyces.

MARMOPTERYX SPONSATA, n. s.

Above very pale ochrey, silky, immaculate except that the white bands of the under surface are reflected; fringes white checkered with brown. Beneath primaries as above; costa and apices yellow, strigate with red; a whitish band interrupted before vein 4 at extremity of all very vaguely indicated. Hind wings yellow strigate with red except for a space on internal margin before the band, where they are blackish. A broad white

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band broken superiorly and interrupted at the binding; it appears as a spot again above the white discal spot. Body light ochrey above, white beneath. Expanse 30 mil. New Mexico, Las Vegas. Prof. Snow.

This must be allied to *Formosata* and *Dryadata;* it differs from the latter description in the color not being "russet" and in the interrupted mesial band beneath. Smaller and paler than *Seifferti.* No. 1015.

AGROTIS DOLLII, n. s.

♂ ♀. Male antennæ pectinate, ciliate. Eyes naked, unlashed. Tibiæ all armed. Labial palpi with spreading hairs. Base of legs and thorax beneath pilose. In appearance allied to the *Lagena–Vernilis* group, but not unlikely best placed near *Rileyana.* Gray washed with rusty ochreous. The ♀ shows the pale claviform spot. There are rusty cuneiform marks before the s. t. line; the terminal space is darker; median space grayer than the rest. The rusty ochrey paler tint obtains over subterminal space. Orbicular small, sagittate, pointed outwardly. Reniform small, upright, scroll-shaped, flecked with white on median vein. T. a. line with large teeth; t. p. line denticulate; both lines single, faint dark gray, rather approximate. Thorax rusty gray. Hind wings white in both sexes; veins incompletely marked; fringe white. Arizona. Coll. Mr. B. Neumoegen. I name this fine species for Mr. J. Doll, who collected it in the San Francisco Mountains. Its colors are not distinct, but they are harmoniously blended, the markings easy to recognize the species by, and it is a well-sized and notable addition to our fauna.

AGROTIS NIVEILINEA, n. s.

♂ ♀. More robust than *Ridingsiana*, with white secondaries like *4-dentata*, stouter than this or *Cicatricosa. A white line crosses the tegulæ*, parallel with the white streak on subcostal vein. Thorax fuscous. Color varying to rusty fuscous, the female and most of the males tend to be pale. Median vein narrowly striped with white. A rusty stain on the subequal stigmata. White dentate shades accompany more prominently the black veins 3 and 4, and less so veins 6 and 7. Median lines black, lunate, relieved by rusty shades. Hind wings white with terminal line and white fringes. *Expanse* 35 mil. Arizona, Mr. Doll. Nearly a dozen examples.

HELIOPHILA RIMOSA, n. s.

♂. Fore wings hoary gray, something like *Ligata* in color; irrorate with dark speckles, and with a faint warm shade reminding one a little of *Unipuncta* in these respects. Allied to *Commoides;* no lines or spots

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visible except that there is a continuous series of excessively minute subterminal dots, and the median vein is faintly marked with white and edged with black, the white color accentuated at base of 3rd and 4th m. nervules. Hind wings pale gray, whitish; veins soiled. Beneath a blackish shade marks the inception of s. t. line on costa, and the median vein is shaded at base of nervules. Hind wings with costa darker; no lines or spots. Face and pectus a little smoky; fore tibiæ pale outwardly. Thorax gray; abdomen paler. Eyes hairy. *Expanse* 34 mil. Kittery Point, Mr. Thaxter.

HADENA HAUSTA, n. s.

♂. A small species related to the European *H. Strigilis*, but with the dark shade not extending over the reniform, which with the s. t. space is grayish. Deep brown from base to t. p. line except over reniform, beyond which the geminate t. p. line is exserted roundedly. Terminal space narrow, ferruginous. A costo-apical light-brown spot on s. t. space. Fringes dark, finely cut with pale. A black mark in place of claviform spot, crossing median space. Median lines double, indistinct. Hind wings pale fuscous, with mesial line; beneath with distinct dot and a fine dark line. Anal hairs somewhat yellowish. Head and thorax dusky brownish. Smaller and darker than *H. Modica*. *Expanse* 21 mil. Kittery Point, Me. Mr. Thaxter.

ZOTHECA VIRIDIFERA Grote.

Allied to var. *Viridula* of *Tranquilla* in color and size. The median lines are nearer together on internal margin. An olive-green patch on cell between the concolorous obsolete stigmata; another larger and paler fills the median space below s. m. fold to internal margin. Transverse lines single, olivaceous; t. p. exserted over median veins; s. t. marked only on costa. General color a faded pale olivaceous; hind wings paler with exterior line. Arizona; coll. B. Neumoegen, Esq.

SPRAGUEIA SORDIDA, n. s.

An obscurely colored species, with the fore wings rather narrower than usual. Primaries dark colored, fuscous brown, broken by pale scales, the most prominent mark a pale yellowish costo-apical spot, set in a deep brown pre-apical shade. The base is olive fuscous to a deeper brownish transverse anterior band; the disc is broken with pale scales to costa enclosing a brown mark. The whole very indistinct. Hind wings silky fuscous, deeper shaded terminally. Beneath silky fuscous; costa of pri-

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maries narrowly pale yellow and the light yellow costo-apical spot repeated; internal margin pale. Texas. *Expanse* 15 mil. In my collection.

No one who has carefully examined our dozen species of *Spragueia*, and carefully dissected, as I have done, all but two or three, observing the neuration and the narrow wings, can fail to consider the genus valid and essentially different from *Erotyla sulphuralis* of Europe.

(To be Continued.)

CORRESPONDENCE.

DEAR SIR: The unusually mild and balmy weather that we have been enjoying for the last week has made it an easy task for the Entomologist to neglect his cabinet and correspondence, even now, in the very heart of the exchanging season, and go out into the woods in search of treasures. Thus many a luckless *Vanessa* or *Grapta*, beguiled by the warm, seductive sun from her winter quarters, to have a last aerial promenade before her long cold nap, has found her way into our collections. The morning of Thanksgiving Day here (9th Nov.) seemed to outdo all its fellows in its efforts to charm grumbling mankind, and seemed to insist on every one being thankful and happy. To the lover of flowers the woods provided several autumn blossoms of such flowers as *Viola blanda* and *V. Canadensis*, late blooms of Solidagos, *Achillæa millefolium*, and stunted Asters whose heads had been broken or eaten off by cattle, but who were yet determined to have their look at the world. Among the damp trees the gauzy-winged male moth of the canker worm could frequently be seen hurriedly flying from tree to tree in search of his wingless wife. On the walls of a house several specimens of the curious little Hammer-headed Fly, *Sphyracephala brevicornis*, were taken. A fine specimen of *Vanessa Milberti*, which came to peer at me by settling within a couple of feet of my head, reminded me of the following, which formerly appeared in the Dublin Penny Journal, and which, as such literature is not at all common, I thought might be entertaining to some of the readers of the ENTOMOLOGIST:

"At the last meeting of the Entomological Society, Feb'y 5, 1844, a beautiful specimen of *Pontia rapæ*, evidently just disclosed from the chrysalis, was exhibited by F. Bond, Esq., which he had captured during the preceding month."

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Child of the Summer, what doest thou here,
In the sorrow and gloom of the weeping year?
When the roses have withered that bloomed on thy birth,
And the sunbeam that nurs'd thee has passed from the earth;
The flowers that fed thee are frozen and gone—
Thy kindred are perished, and thou art alone—
No one to welcome—no one to cheer—
Child of the Summer, what dost thou here?
Yet 'tis sweet thy gossamer wing to view,
Revelling wild in the troubled blue—
Heeding nor rain, nor snow, nor storm—
Buffeting all with thy tiny form.
Even thus the hope of our summer days,
In the heart's lone winter gaily plays—
Thou art the type of that hope so dear—
Child of the Summer! thou'rt welcome here!

Welcome 'mid sorrow, and gloom, and showers,
Emblem of gladness that once was ours—
Emblem of gladness that yet will come,
When the sun-bright ether will be thy home;
And myriads of others as bright as thou,
Will revel around us—all absent now:
Emblem of hope to the mourner dear,
Child of Summer! thou'rt welcome here!

Ottawa, Nov. 13th, 1882. JAMES FLETCHER.

DEAR SIR: On the 16th of August last I captured in our orchard a beautiful female specimen of *Papilio cresphontes* Cram., in perfect condition and evidently not long emerged from chrysalis. Some days later (Aug. 22) a specimen was seen and pursued without success, and on the 29th another very large female was taken. As one of the food plants of the larva, Prickly Ash (*Zanthoxylum americanum* Will.) is abundant here, I think they must have bred in this locality, which is about fifteen miles south of Montreal. I think this is the first record of this butterfly being taken in the Province of Quebec. *Euptoieta claudia* Cram., another butterfly rare in this latitude, was taken by me August 15, 1874, near a hop-field, and is now in the collection of the Montreal Nat. Hist. Society. I mention this as Mr. Edwards gives Canada no credit for this species in his useful Catalogue. JOHN G. JACK.

Chateauguay Basin, P. Q., Oct. 29, 1882.

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BOOK NOTICES.

An illustrated Essay on the Noctuidæ of North America, with "A Colony of Butterflies," by A. R. Grote, A. M. Lge. 8vo., pp. 85. Published by John Van Voorst, Paternoster Row, London, Eng.

This little volume is beautifully got up, printed in bold type on fine paper, and illustrated by four excellent colored plates on which forty-five species of Noctuids are figured. These moths have been previously described in various works, but have not been figured before, and appear to have been selected to adorn this handsome little book on account of their striking beauty; they are the gems of the genera to which they belong and well deserve to be thus made better known. Each specimen is numbered and accompanied by a brief reference or description.

In a preface of 23 pages the author gives a "brief *résumé*" of the sources from whence he has drawn his information; an account is also given here of the life history of the Cotton Worm from the egg to the perfect insect. It is to be regretted that the author should have marred this section of the work by a personal attack on Prof. Riley, an Entomologist who has done so much good work in Economic Entomology. It seems to us most unfair, whatever the provocation may be, to introduce personal reflections of this sort in a book where the party referred to has no opportunity of defending himself or of an explanation which will reach the same readers. Notwithstanding this defect, the little volume will commend itself for its excellencies otherwise, to all those who are interested in the study of the Noctuidæ, as a valuable and beautiful contribution to this department of Entomology.

Transactions of the Ottawa Field Naturalists' Club. No. 3, 1881-1882; 8vo., pp. 66, with two plates.

We commend this record of the work of the Ottawa Field Naturalists' Club to all those who are interested in Canadian Natural History. In addition to the excellent address of the President, James Fletcher, Esq., it contains reports of the work accomplished by the Geological, Botanical and Entomological branches of the Club; a list of the birds found in the vicinity of Ottawa, and addresses which have been delivered on various natural subjects at the soirees held by the Club.

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The Canadian Entomologist.

VOL. XIV. LONDON, ONT., DECEMBER, 1882. No. 12

ENTOMOLOGY FOR BEGINNERS.

THE POPLAR DAGGER-MOTH—Acronycta lepusculina, Guenée.

BY THE EDITOR.

The caterpillar of this moth is often very destructive to poplar trees, and more especially to the foliage of the cottonwood tree in the west. It is, when full grown, an inch and a half or more in length, with a black head, and its body clothed with long, soft yellow hairs, from amongst which arise along the back five long pencils of black hairs. When at rest it curls itself up on the leaf as shown in figure 22.

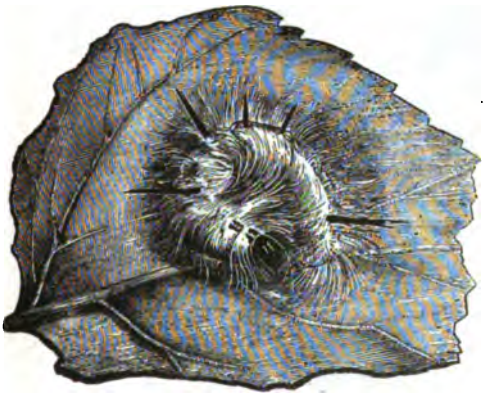

Fig. 22, after Riley.

When full grown the caterpillar spins a pale yellow cocoon of silk interwoven with its own hairs, hidden in some sheltered spot, and there changes to a dark brown chrysalis, from which in due time the moth appears.

The perfect insect measures when its wings are expanded about an inch and three-quarters across, see figure 23. Its wings are gray varied with dark brown dots and spots and shadings. Near the hinder angle of the front wings is a rather conspicuous spot not very distinctly shown in the figure, resembling the Greek letter *psi* placed sidewise. There are two broods of this insect during the year; the moths of the first appear in June, deposit eggs which produce larvæ that reach their full growth, pass through

Fig. 23, after Riley.

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the chrysalis stage, and from which moths emerge about the end of July. The second brood of larvæ are found about the last of August and throughout September; they become chrysalids late in the season, and pass the winter in the chrysalis state.

THE LIME-TREE MEASURING WORM—Hybernia tiliaria Har.

The larva of this insect is a yellowish looper or measuring worm with a reddish head and ten wavy black lines along the back. It is shown in

Fig. 24, after Comstock.

figure 24, in different positions. It is hatched early in the spring and completes its growth about the middle of June, about which time it is often very destructive to basswood, elm, hickory and apple trees. When ready for its next change the larva lets itself down from the tree by a silken thread and buries itself five or six inches below the surface of the ground, and there changes to a chrysalis from which the moth usually

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escapes the following spring. Occasionally some of the moths appear in October or November, but this rarely occurs with us.

The male moths have large and delicate wings and feathered antennæ, as seen in the figure. The fore wings, which measure when spread about an inch and a half across, are of a rusty buff color, sprinkled with brownish dots, with two transverse wavy brown lines and a central brown dot. The hind wings are pale with a brown dot about their middle.

The female, also shown in the figure, is a wingless, spider-like creature, with slender thread-like antennæ, yellowish white body, sprinkled on the sides with black dots, and with two black spots on the top of each segment excepting the last, which has only one. The eggs are oval, of a pale color, and covered with a net-work of raised lines.

LONG STINGS.

BY FREDERICK CLARKSON, NEW YORK CITY.

In the May number of the CANADIAN ENTOMOLOGIST there is a very interesting paper under this caption, contributed by Mr. Harrington, giving an account of the habits of the *Rhyssa atrata* and *lunator*. These Long Stings the past summer were very abundant at Oak Hill, the residence of Mr. Herman T. Livingston, in the township of Livingston, Columbia Co., New York, and furnished me with a good opportunity of studying their habits. While I agree with all that has been so well observed and so cleverly presented by your correspondent, I am somewhat disposed to differ from the commonly accepted opinion that these insects deposit their ova on the larvae of wood-borers. My experience has demonstrated that while it may be a fact that these insects deposit their ova on the larvae of the Uroceridae or other borers, they do not commonly do so. In every case that came under my observation, the long ovipositor, instead of penetrating through the burrow of a *Tremex* or other wood-borer, entered through wood that had not been previously attacked, and though I failed to discover the egg deposited, I am very much of the opinion that the deposition is oftentimes, if not generally made regardless of the contact with a larva. My observations were necessarily confined to such visitations from these insects as were made to a somewhat decayed stump of a beech tree, for though there were a

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number of oaks and other trees close by, their choice was for the beech, to which both species were constantly arriving and inserting their long ovipositors. At the close of each day I cut off, to the depth of six inches, such portions of the stump as had been attacked, but failed to detect in any of the cuttings either the burrow or larva of *Tremex* or other larva. I also noticed that the wood as exposed by such clippings as I had made, attracted the greatest number of these insects. I regard it therefore a matter of considerable doubt if either the *atrata* or *lunator* commonly deposit their ova in the body of wood-boring larvae, and it seems to me that if these ichneumon larvae are carnivorous, they must possess the power of boring in search for their food. I do not suppose that these insects perform the great labor of inserting their long ovipositors upon the merest chance of meeting with a larva, but rather that they deposit their eggs at every insertion, my observations abundantly proving that they are not governed by any instinct in the selection of particular spots, so far as regards the presence of larvae.

NOTES ON THE OCCURRENCE OF SOME SPECIES OF UROCERIDÆ.

BY W. HAGUE HARRINGTON, OTTAWA, ONT.

Although my collections hitherto have been chiefly of Coleoptera, I have, as opportunity offered, captured specimens in other orders, and among those thus taken during the past season are representatives of a few species of the Uroceridæ. I wish now to record a few brief notes on these—the more readily because so little regarding this group has been published in the ENTOMOLOGIST.

1. On the 25th of June last I captured upon a recently dead maple tree, near my house, two rather small insects, of which the larger had its ovipositor inserted in the bark. They proved to be two female specimens of *Xiphydria albicornis* Harris. One was half an inch long, the other five-eighths.

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2. About the same date I also found upon a maple another female, which may be only a variety of those just mentioned, or, possibly, a distinct species. The antennæ are *dark;* the head has two scarcely perceptible white dots; the legs are much yellower, and only four of the abdominal segments are marked with white, the dots being very small. It may be *mellipes* of Harris, which he describes as differing chiefly from *albicornis* in having "only four white spots on each side of the abdomen." Length as given by Dr. Harris, four-tenths of an inch; of my specimen five-eighths of an inch.

3. In looking over my summer collections a few days ago, I discovered an insect which is evidently a male of one of the preceding insects. Unfortunately it had been hastily pinned without labelling, so that I cannot give the place of capture or the precise date, which, however, must have been in June or July. It is small, being barely three-eighths of an inch long; head of a clouded yellowish-white color, with a dark brownish stripe on the vertex; antennæ dark; thorax chiefly white beneath, and with two V-shaped whitish marks above; wings small; abdomen long and very thin.

4. *Tremex columbia* Say is very destructive here to old beech and maple trees, especially such as are isolated and growing along road sides, or have received gashes or injuries of the bark. The Rev. V. Clementi has recorded (vol. 1, page 29) the issue of specimens from oak firewood which had been placed near a warm stove. The date of the occurrence is not given, but as the number containing the account was published on 16th Nov., it probably occurred a month earlier. Dr. Packard (Bulletin No. 7, "Insects Injurious to Shade and Forest Trees") infers from this that the insects mature in the autumn and hibernate as imagines. I can find no mention of them emerging (under natural conditions) late in the season, although they must often do so, as shown by the following instances. On the 9th of Oct., 1880, I found one ovipositing in an old beech. Knowing that the tree had for some time been much infested by these borers, I made a careful examination of it, and soon saw the mandibles and a portion of the head of some insect which was gnawing its way through the bark. This operation I hastened with the aid of a pocket-knife, and found that it was another large female Last month (Oct.) I kept a careful watch for these insects, to ascertain, if possible, whether their appearance at such a late date had been an exceptional

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event. On the 1st I found one upon the plank-walk of one of our streets, and on the 9th a second under some maples bordering another street. The following day I went specially to visit some old maples which are a favorite resort of these insects, and captured upon one of them a female in the act of ovipositing, while upon the same tree were the bodies of three or four which had evidently very recently perished in the performance of such act. In another tree were a number of holes from which specimens had apparently but lately emerged. Although this species is so common, I have not yet captured a male (nor even seen one except in a collection), yet Dr. Harris, if I remember correctly, describes them as swarming around the ovipositing females. I may here add that on the 30th Sept. I saw one of their chief enemies, viz., a fine female *Rhyssa lunator* Fab., flying actively about.

5. *Urocerus nitidus* Harris. The abdomen of this species terminates in a triangular point like that of the preceding one, and very unlike the long spear-shaped horns of the two following. The females agree in nearly all respects with that described by Kirby (see vol. ix., page 148) as *Sirex juvencus* Linn., but the antennæ are longer than the head and thorax, instead of "shorter than the thorax." Harris describes it, however, as differing "from the European *U. juvencus* in the much greater brilliancy of its color and in having shorter antennæ." The female is a handsome insect of a deep greenish-blue color; the head and thorax rough and hairy, but the abdomen smooth and glossy; the antennæ are black and the legs yellow. Harris states that the males are unknown, but I have been so fortunate as to secure several. The head, antennæ, thorax and four anterior legs resemble those of the female. The posterior pair of legs are much swollen, and are black, with the exception of the thighs. The abdomen is flattened; the fourth, fifth, sixth and seventh segments are of a deep orange, or reddish-yellow color, and the last segment is less sharply pointed than that of the female. This species appears to be most abundant in the latter part of Sept. and the beginning of Oct., during which period I captured ten females and three males, as follows: Sept. 21st, female; 23rd, male and female; 24th, female; 26th, female; 29th, 2 female; 30th, female; Oct. 1st, male; 2nd, male and female; 8th, female; 18th, female. I have also two males of which the date of capture is not recorded. They were taken about the beginning of Sept. The females measure from three-fourths of an inch to one and one-eighth

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inches in length; the wings expand from one and one-eighth to one and three-fourth inches. The males are from nine-sixteenths of an inch to one and one-eighth inches long, with about the same expanse of wing. All the above specimens were taken in the city, generally in the morning upon the sidewalks or fences. The majority of them were under or near maples, and one was taken upon a tree box, which has led me to think that they may perhaps attack these trees, although I could find no evidence of their having done so. Probably they may have issued from the pine timber or lumber of which there is so much about the city.

6. *Urocerus albicornis* Fab. I captured a female of this species on the 22nd of Aug., and another on the 26th. Both specimens were taken in the centre of the city, and about the same time other specimens were observed flying up and down the street. One was seen to hover for some time about a telegraph pole, and all the specimens seen were within fifty yards of this pole. The insect was at some distance above the ground, so that the pole at that point could not be inspected. The presence of the insect on it may have been accidental, and all the specimens may have flown from the lumber yards.

7. *Urocerus bizonatus* Stephens is a handsome species, larger and stouter than the preceding one and readily distinguished by its yellow legs and antennæ, the yellow lumps behind the eyes, and the two yellow bands across the abdomen, from which it derives its name. I cannot yet record it as occurring here, although one day about the end of Aug. I saw upon a house a *Urocerus* which appeared to be this species. It flew away, however, before I could closely observe or capture it. There is a specimen in the collection of the late Mr. Billings, but it may not have been taken here. Kirby (vol. 7, page 159) records it as taken in Lat. 65° and on the journey from New York. I have received from British Columbia two fine specimens taken by Mr. A. J. Hill, C. E., Can. Pac. Ry. Kirby gives the length of his specimens as eighteen lines and their expanse of wing as twenty-five lines. These are the measurements of my larger specimen; the length including the ovipositor, without which it is only an inch long. Has the male been described? I imagine it must be very similar in appearance to the specimen described by Harris as *U. abdominalis*.

The males of all the species seem to be rare, even those of our commonest species being seldom seen.

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Not having a monograph, or even a catalogue of the Uroceridae, nor access to a good entomological library, I do not know how these insects are at present classified.

A CARD.

After twenty years work on North American Moths, and being more or less constantly employed in determining material, I find my time so taken up with it that it excludes other occupation. From this fact, and the expense and time demanded by the necessary correspondence, I am obliged to make a charge for my labor. All specimens will be returned in future, and a charge of ten dollars per hundred or ten cents a specimen will be made for labelling them, exclusive of transport and postage.

A. R. GROTE, New Brighton, Staten Island, N. Y.

October 1, 1882.

ALYPIA OCTOMACULATA.

BY H. H. LYMAN, MONTREAL, P. Q.

Last June I was in Boston, from the 14th to the 30th, and during this time *Alypia octomaculata* was in season and very abundant. Had I chosen to carry a net in the public gardens and uptown streets, I suppose I could have taken a couple of hundred specimens, always provided that I wasn't "run in" as a lunatic. As it was, I contented myself with carrying a supply of pill boxes, and succeeded in taking about thirty-five specimens. During two days I was visiting a friend about seven miles from the city, but did not see a single specimen of this species; but in those streets in which there were small plots of grass in front of the houses, they were very common. The spot where I took the most of those I captured was a plot of grass about ten feet by seven, in which there was a Syringa between two Deutzias, both species of shrubs being in blossom. The *Alypias* constantly frequented the latter, and were then easily taken with a pill box, but though they occasionally alighted on the leaves of the Syringa, I never saw them visit the flowers.

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DESCRIPTION OF THE PREPARATORY STAGES OF PYRAMEIS ATALANTA, LINN.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Barrel-shaped, the ends narrowing equally and rounded; the base flattened over a little space; from the edge of this start nine vertical and straight ribs, at first low, but gradually rising in elevation and after the middle rapidly, till at the top they are very prominent, and terminate abruptly about the rim of the depressed summit; these ribs are thin and grooved on both sides perpendicularly to the surface of the egg; between them the surface is a little excavated, and smooth; color green. Duration of this stage 5 days in May, 3 to 4 in July.

YOUNG LARVA.—Length .08 inch; cylindrical, tapering posteriorly from 4th segment; each segment rounded; color greenish-brown, semi-translucent; furnished with ten rows of black curved hairs, of which two are close together on middle of dorsum, two are lateral above spiracles, one is partly in line with, partly below spiracles, and one below this; on 2 is a sub-oval black chitinous patch, with four hairs on either side the medio-dorsal line, three others in vertical line below the patch; 3 and 4 have five hairs on each side in vertical line, but from 5 to 12, while there are five hairs, they form two lines, the 1st, 3rd and 5th being in front part of the segment; the anal segment shows two hairs on the side, and a black dorsal patch, on either half of which are about five hairs; two small hairs over each foot and proleg; on 2 to 4 the hairs are curved forward, on the other segments back, but on all the lowest row is turned down; so on 2 to 4 the next row is turned down; head rounded, black, with a few black hairs. Duration of this stage in May 4 days, in August 3.

After 1st Moult.—Length .12 inch; wholly black-brown; armed with 7 rows of short, slender, branching black spines, head rounded, bi-lobed, the vertices rounded, black, thickly covered with simple, irregular-sized black branching spines, each ending in black hair; on 2 is a chitinous dorsal bar with simple spines. Duration of this stage in May and August 2 days.

After 2nd Moult.—Length .3 inch; very nearly as at preceding stage To next moult 2 to 4 days.

After 3rd Moult.—Length 4 inch; color more black; each segment several times creased and on the ridges so caused are many minute whitish

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tubercles; in line with spiracles a macular greenish-yellow band, more or less pronounced, the spots or patches lying on either side the junctions of the segments; the spines longer in proportion than before, but slender, and black; head brown. To next moult 3 days.

After 4th Moult.—Length .6 inch; in from 3 to 4 days the larva reaches maturity.

MATURE LARVA.—Length 1.3 inch; cylindrical, obese, the middle segments much thickened, all well rounded; color usually velvet-black, thickly sprinkled with fine yellow points, caused by little tubercles; in line with spiracles a series of greenish-yellow patches lying on either side the junctions of the segments, and forming a macular band; but this is variable, sometimes being obsolete, or nearly, at others nearly, and even quite, continuous; under side smoky-brown; armed with 7 rows of moderately long, slender, branching spines, which are usually black; but in some examples are pale yellow-white, and more or less reddish at base, especially on anterior segments; one of these rows is dorsal, three lateral; the dorsal spines run from 5 to 12; the 1st lateral from 3 to 13; the 2nd lateral from 3 to 13; the 3rd from 5 to 12; besides these are smaller spines along base and over feet; on 2 is a collar of 12 small spines, 6 on dorsum, 3 on either side; feet black, pro-legs smoky-brown; head rounded, bilobed, the vertices rounded, thickly covered with sharp conical black simple spines, of varying size, each tipped with black hair; color dull black. From 4th moult to pupation 5 to 6 days.

Chrysalis.—Length .85 to .95 inch; cylindrical, the abdomen stout; head case moderately produced, bevelled transversely and equally on both sides, the ocellar projections not prominent; mesonotum high, rounded, and bears on summit a small nose-like ridge; the dorsal tubercles rather large, more or less gilded, the lateral, in two rows, minute, black; color varies; usually reddish-gray, more or less densely reticulated with black; the lighter colored caterpillars make light colored chrysalids—greenish-gray with usually a bronze sheen over dorsal area; this is sometimes seen in the darker examples; the whole surface covered with a delicate bloom. Duration of this stage about 7 days.

There is much variation in the color of the caterpillars after 3rd moult. What I describe above I have found to be the usual color at Coalburgh. But some examples have the whole upper side spotted with yellow, covering fully half the surface; others are yellow-green, more or less specked brown, and sometimes there are patches of brown on the

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sides. Usually these last have a confluent, instead of macular, yellow band, along the side, and the spines are always light, whitish, or yellow-white, with or without red at base. So the head is brown instead of black in these green examples, and many of the spines on head are white.

But English authors describe the larva of *Atalanta* as considerably unlike the foregoing.

Mr. Stainton, Manual Brit. But., 1857, gives it as "yellowish-gray, with a pale yellow lateral line," and says nothing of any other color.

Westwood & Humphreys, in Brit. But., p. 55, say: "The caterpillar is of a dusky green color with a yellowish dorsal line and also a pale line on each side above the feet."

Mr. Edwin Birchall, in Ent. Mo. Mag., vol. 13, p. 210, 1877, writing from the Isle of Man, says that the butterfly is very common there and almost everywhere in the British Islands, and that in the Isle of Man the larvæ had swarmed in every lane, in 1876; and goes on to say: "The larva varies in color remarkably, but may generally (perhaps always) be classed under one or other of the following descriptions, and yet the color of some of them is so far intermediate that the variation can scarcely be called simply dimorphic.

"1. Ground color gray-green, varying to dingy white, the lateral stripe not very distinctly marked. *This is, I think, the typical form, and the only one that I have seen in England.*

"2. Ground color intensely black, the lateral stripe white or yellow."

Now it is a noticeable fact that my larvæ at Coalburgh were nearly all black in last stage, the lateral stripe usually macular, and greenish-yellow. A few examples were yellow-green instead of black, about 5 per cent. of the whole, and in these the lateral stripe was more continuous than in the black ones, and about 5 per cent. were mottled black and yellow. Here were three distinct types of larva. I have noticed the same thing in larvæ of previous years here, but how it is in other parts of the United States I do not personally know. Dr. Harris says: "The full grown ones are generally of a brown color more or less dotted with white." Mr. Birchall says the British type is gray-green varying to dingy white. This last color I have never met with, and the other authors quoted lead me to believe that the usual color is gray-green, or yellow-gray, or dusky green, but not black. Whereas so far as I know, the American type is black, and the gray-green or yellow are the exceptions.

Mr. Newman also says that the females of *Atalanta* have a small round

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white spot in the scarlet band on fore wings. Mr. Birchall, however, says : "The white spot sometimes found on the upper surface of the scarlet band is not indicative of the female sex ; it was present in about one tenth of the specimens (he raised upwards of 100 butterflies), was produced from both forms of larvæ, and in about equal numbers of both sexes. It varies greatly in size, in some specimens being a barely discernible speck." None of my butterflies, at Coalburgh, showed this white spot, nor have I any example from any locality which shows it. I asked Mr. Lintner to examine his specimens and report on this spot. He writes : "I have but five, and one of the females has an extra white spot in the band in the second median interspace."

Atalanta is one of the few species of butterfly which are found the world over. In West Virginia, there are three broods of the larvæ, the first in May and early June, the second in July and early August, the third late in September, and the butterflies from the last larvæ hibernate, hiding probably in hollow trees, crevices of outhouses and barns, perhaps among rocks, ready to come forth in warm days of winter or early in the spring. I always see them about the wild plum blossoms, which are almost the earliest of the year. In two or three years of the last fifteen, it has been an easy matter to find the caterpillars in considerable numbers, but the present season, 1882, has been remarkable over all for their great abundance. I brought in, one day with another, in June, at least 150, and could have had a thousand. We have here Nettles, urticæ, which the books mention as the food plant of this species, but the False Nettle, Boehmeria cylindrica, is almost invariably selected by *Atalanta* ♀ for depositing her eggs. Grapta *Comma* feeds on the same plant in preference to nettles, and sometimes G. *Interrogationis* larvæ are found on it also. The winter of 1881-82 was exceedingly mild, and apparently the mildness was the cause of great destruction of hibernating butterfly larvae and chrysalids, in this section. Experiments show that larvae of Argynnis and Satyrus kept at a low artificial temperature through the winter months are healthy, and it is to be presumed that mild weather, which allows but semi-torpidity, and more or less activity, must be disastrous in many cases. Besides, a mild winter encourages predaceous insects, spiders, birds, etc., which destroy larvae and chrysalids. Certainly butterflies were never so scarce since I have collected, as in the season just past, and many species usually very common here were altogether wanting. In the case of hibernating imagos, a mild winter may not be unfavorable for their

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preservation. They are supposed to be well out of reach of many sorts of enemies in their hiding places. Some years ago, the late Dr. L. K. Hayhurst, in charge of a construction force on one of the railroads running south from Sedalia, Mo., wrote me that his men had cut down a hollow tree, which broke with the fall and disclosed quite a number of butterflies, of different species, in hibernation. For myself, I have never seen a butterfly in that condition.

The larvae of *Atalanta* are remarkable for the construction of cases or pouches in which from the first stage to last they live concealed, and finding them so plenty, I set myself to watch their operations. But first I read up the history so far as books at my disposal gave it. The accounts in these books are very meagre, and but half correct. The fullest is given in Newman's Nat. Hist. of Br. But., pp. 62-3, where we read: "The egg is solitary, laid *here and there on the leaves* of the stinging-nettle; almost immediately after emerging from the egg, the little caterpillar *draws together the leaves* of the nettle and feeds in concealment; as it increases in size, it requires more space, and *continues to increase the size of its domicile* up to the period of pupation; I have never met with it feeding exposed. . . . When full-fed, it constructs a somewhat more elaborate retreat; it gnaws through the petiole of a leaf, or eats the main stalk of the nettle within a few inches of the top, not quite separating it; the part thus almost separated falls over and completely withers, and *this withered portion is formed into a compact retreat*, secured from casualties of weather and from the inspection of birds; *from the roof of this the caterpillar suspends itself* . . and in two days becomes . . a chrysalis," &c. (The italics in all the quotations given are mine.)

Dr. Harris, Ins. 1862, p. 294, says: "It deposits its eggs in May *upon the youngest and smallest leaves of this plant* (Nettle), not "here and there," as Newman has it, "*being cautious to drop only one upon a single leaf*, As soon as the caterpillar is hatched, *it spins a little web to cover itself, securing the threads all around to the edges of the leaf, so as to bend upward the sides and form a kind of trough in which it remains concealed. One end of the cavity is open, and through this the caterpillar thrusts its head while eating. It begins with the extremity of the folded leaf, and eats downwards, and as it gradualty consumes its habitation, it retreats backwards, till at last, having, as it were, eaten itself out of house and home, it is found to abandon its imperfect shelter, and construct a new one. This is better than the first;* for the insect has become larger and stronger, and withal, more

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skilful from experience. The sides of the larger leaf . . . are drawn together by silken threads, so that the edges of the leaf meet closely and form a light and commodious cavity, which securely shelters and completely conceals the included caterpillar. This in time is eaten like the first, and another is formed in like manner. At length the caterpillar, having eaten up and constructed several dwellings in succession, and changed its skin three or four times, comes to its full size, leaves off eating, *and seeks a suitable place in which to undergo its transformations*," &c. "The butterflies from the first brood appear in July, and from the second in September" (in Mass.)

Mr. Scudder's account is very brief, Butterflies, p. 110: "The caterpillar constructs a somewhat similar though more perfect nest (i. e., than what is called a Tiger Swallow-tail,—whatever that may be, some Asiatic species we may suppose), by fastening together the opposite edges of a nettle-leaf, the tip of which it eats *when too lazy to go from home*, until there is barely enough left for shelter; *its weight causes the leaf to droop, so that the nest is easily discovered*."

The only information contained in Westwood & Humphrey's British Butterflies, 1848, on the habits of the larva of *Atalanta* is this: According to Sepp., the caterpillar, after it is hatched, selects a Nettle-leaf, which it draws together with threads into a roundish, hollow form, leaving for the most part *an opening into the interior both before and behind*, thus serving both for shelter and food until almost devoured, when it selects a fresh leaf, and proceeds with it in the same manner, one caterpillar only being found on a single leaf, thus indicating a peculiar liking for a solitary life."

Boisduval and Leconte, 1833, say: "It lives isolated on Nettle, and is almost constantly concealed between many leaves drawn together by some threads."

(To be Continued.)

NEW SPECIES AND NOTES ON STRUCTURE OF MOTHS AND GENERA.

BY A. R. GROTE, A. M.

(Continued from Page 218.)

CAMPOMETRA AMELLA Guen., 3, 25, pl. 18, fig. 8.

This genus and species I have accidentally omitted from the "New Check List." I have never identified the species with certainty. For

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some time I have conjectured it was the same as *Eubolina Stylobata* Harvey. With regard to the genera separated from *Homoptera* by Guenee, I have merely insisted on the validity of *Zale* in former papers. But I am averse to throwing them together until we know the early stages upon which Guenee seems to have relied, using Abbot's drawings. Another reason with me has been (as I have pointed out) that *Homoptera* is a term used in another Sub-order of Insecta. Probably *Pheocyma* will have to be adopted, as the insect I have identified as *Lunifera* (figured by Guenee) does not seem to me to differ generically from our other species arranged under *Homoptera.*

The type of *Eubolina Impartialis* recalled to me the *Homoptera Stylobata* and *Mima* of Harvey, by the less completely lined secondaries, and I have grouped the species near *Homoptera*, where I am satisfied they are better placed, though probably higher than *Homoptera* and leading to it. Unfortunately I made no study of the genus and cannot be certain that the forms are correctly associated. *Impartialis* will probably occur in Texan collections; when I receive a specimen I shall examine it with a view to settle its relationship with *Campometra* and the species referred to *Eubolina* in the "New Check List." Among the genera I have never seen and which I cannot form any opinion upon from the descriptions are *Thaumatopsis* and *Homophoberia.* Although Mr. Smith does not mention *Cilla Distema*, I do not think this can be the former. Mr. Smith seems to have published his "Synopsis" without knowing a large number of my generic types. But he seems to have all of Mr. Morrison's, and, while following my reference of *Eutricopis* to *Melicleptra*, he rehabilitates *Eucalyptera* as distinct from *Scolecocampa* on the position of the labial palpi; this did not seem to me essentially different, and the two insects have as close a general resemblance as *Plagiomimicus* and *Polenta* and agree in other characters almost exactly; I cannot now re-examine them, but as the claw on the front tibiae of *Tepperi* is overlooked by Mr. Smith, and the exposed cup-like clypeal structure of *Plagiomimicus*, I feel certain that the "Synopsis" is both unreliable and partizan, and the determined use of Boisduval's and Treitschke's genera when they have not the sanction of priority, confirms my belief that it is written with a bias. Every omission to make a complete and faultless diagnosis on my part is made much of, while the generic descriptions of other writers, wanting in every point: such as accuracy of statement, circumstantiality, completeness, comprehension of the real affinity of the type (e. q. *Polenta*, etc.,) are

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passed upon as if already well described. So that it seems to me that Mr. Smith's refusal to recognise certain proposed genera is not the result of their want of given characters but of their authorship. Genera such as *Rhododipsa* (not "Rhododispa," and of the few names, "Hypsoropta," "Autoplaga," "Pangrapha," "Pseudoglossa," "Lepidomis," "Nolophana," "Panapoda," "Melicliptria," "Macrohypena," "Shinia," etc., are by Mr. Smith wrongly written) Bull. U. S. G. Surv., vol. 3, 797, are sufficiently described when the eyes, tibiae, clypeus and palpi are noticed comparatively. But an author who considers the color of *Sanguinea* and *Florida*, and their pattern, the same, must be manufacturing his case or be possessed of an honest disregard of differences. Here, also, Mr. Smith unites *Porrima* and *Rhodophora*, although, joined to other differences of armature and vestiture, the palpi are "horizontal" in one case and slightly "drooping" in the other. The palpal difference is *all*, so far as I can see, to separate *Eucalyptera* from *Scolecocampa*, and yet Mr. Smith considers them beyond question distinct, while *Porrima* and *Rhodophora* are united. I do not verify even this palpal difference of *Eucalyptera* and cannot consider the genera distinct. As to *Metahadena* it appears now that it has a claw, and the distinction between it and *Oncocnemis* is in order; the character is not given by its author, whose diagnosis gives no single distinctional character from *Homohadena*.

YRIAS CLIENTIS, n. s.

Size moderate, a little larger than Guenee's figure of *Progenies*. Rather light brown with both wings crossed by a number of dark brown, nearly equally distinct, transverse lines, a little uneven and oblique, bent superiorily; the median lines most distinct. On costa the dark costal dots are relieved by a pale yellowish shade, obtaining especially centrally. An apical black V-shaped mark, enclosed by pale streaks, giving the effect of an ocellus. Body untufted, cylindrical. Beneath paler, with three faint shade bands on hind wings and two, the inner faint, on fore wings. Fringes brown. Arizona. *Expanse* 28 mil.

YRIAS REPENTIS Grote.

I referred this species originally to *Homopyralis*, but it rather belongs to this genus, not previously described from North America. This species is known by the running inwards of the t. p. line. *Expanse* 26 mil. Arizona.

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YRIAS CRUDELIS, n. s.

♂ ♀. Smaller than the preceding; of a more blackish brown color. The subterminal line is inaugurated by a black shade picked out by a following clay-colored edging. The t. p. line is edged on both sides by a similar clay-colored costal shade, and there is a light spot on cell in place of reniform. The median shade is diffuse inferiorly. The lines are dark and tolerably distinct, relieved at the middle of inner margin of secondaries by a pale shade. Beneath glistening, not much paler than above. *Expanse* 20 mil. Arizona. Coll. B. Neumoegen, Esq.

A number of specimens, varying but little in size or appearance.

(To be Continued.)

A NEW STATE ENTOMOLOGIST FOR ILLINOIS.

Prof. Cyrus Thomas, to whom we are indebted for six out of the eleven valuable reports which have been issued by the State of Illinois on noxious and beneficial insects, has removed to Washington, and Prof. S. A. Forbes, of Normal, Illinois, has been appointed State Entomologst in his place. We heartily congratulate Prof. Forbes on his well-deserved promotion, and also congratulate the authorities of the State in that they have secured the services of one so competent, thorough and painstaking as Prof. Forbes has shown himself to be in his published papers on natural science.

DESCRIPTION OF A DIPTEROUS PARASITE OF PHYLLOXERA VASTATRIX.

*DIPLOSIS? GRASSATOR, n. s.

BY REV. T. W. FYLES, COWANSVILLE, P. Q.

LARVA, one-tenth of an inch in length—pointed at the head—rounded and blunt at the hinder extremity. First three segments the color of amber, and semi-transparent: the rest of the body salmon-colored. Nine sets of hooks, or tentacles, in place of feet, the two first in pairs, the remainder in threes. The larva has the habit of holding itself erect, by means of peculiar anal protuberances which seem to cling by suction. The

*This insect is referred to the genus Diplosis in deference to an opinion expressed by Prof. C. V. Riley, when in Montreal in August last.

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body has minute hairs thinly scattered over it. On the sides of the head, which is small and black, there are bristle-like palpi, pointing forwards The larva is full fed by the end of August.

Fig. 25.

In the accompanying figure, drawn by myself from nature, the larva is shown at *a*, the purpa at *b*, and the imago at *c*, all highly magnified. The natural size of the perfect insect is given at *d*.

PUPA, dark brown, about 9-100 of an inch long. The antennæ cases form a striking feature, projecting on either side about one-sixth the length of the pupa, and giving a flattened appearance to the head. A pair of setæ mark the position of each spiracle, and there is a rounded protuberance at the hinder extremity.

IMAGO.—*Wings*, semi-transparent—beautifully opaline—three-ribbed—having the form of the blades of a propeller—fringed with long hairs. Balancers conspicuous. *Antennæ*, setaceous, 24 jointed, having a circlet of hairs around each joint. *Eyes*, large and black. *Thorax*, reddish brown, with a peculiar hump on the back, behind the wings. *Legs*, long and hairy. *Abdomen*, salmon-colored—has two lines of hairs extending lenthwise on the under side. The perfect insect appears early in September.

[This insect was reared by us about the same time as those by Mr. Fyles. It was very common in the neighborhood of London this year, infesting the gall-inhabiting type of the Phylloxera. The following notes in reference to it may be of interest, omitting the description already so well given by Mr. Fyles :

About the middle of August my attention was directed to the foliage of some grape-vines, Clinton and other varieties, which were suffering from an attack of the gall-inhabiting type of Phylloxera. On opening some of the older galls they were found to be free from living lice and occupied by one, or in some instances two, small, brown chrysalids, and a number of the empty skins of the young lice. On further examination many of the galls were found to contain the larvæ of this same insect.

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The egg is deposited by the parent fly in the gall, or at its entrance. Each gall is usually occupied by several full grown lice, and from 50 to 500 minute yellow eggs, which are gradually deposited and as gradually hatched. The young larva of our new found friend is very active, and groping about within the hollow of the gall, seizes on the young lice as hatched and sucks them dry. We could find no evidence of its attacking the parent lice, as long as the newly-born and tender progeny were in sufficient abundance to furnish it with a constant supply of fresh food. In some instances one larva, in others two were found in a single gall; but in no instance have we found living lice with the chrysalids, an evidence that this insect does its work throroughly. A sufficient number of galls have not yet been examined to determine with any accuracy the proportion occupied, but they appear to be sufficiently numerous to materially check the increase of this destructive pest.—[ED. C. E.

CORRESPONDENCE.

DEAR SIR: In the last number of the CANADIAN ENTOMOLOGIST, at p. 219, by the omission of quotation marks at the beginning and end of the piece of poetry, I am credited with the authorship of these lines. This is a mistake; my signature should have come after the word ENTOMOLOGIST on the previous page, and the whole of the subsequent part is a quotation from the Dublin Penny Journal. By making this correction as soon as possible, you will greatly oblige yours truly, J. FLETCHER.

DEAR SIR: In reply to Dr. Hagen's note I would say that Staudinger's *errata* does not alter my position (which can be proved by Staudinger's preferring *Scabriuscula* to *Pinastri*—I took the *Papilio* as better known), but merely shows that he would have still preferred *Sinon*, if *Podalirius* had not really been "*Vetustius*." A reference to Staudinger's "Preface" proves his position and my own. If this note of Dr. Hagen's is intended as a *quid pro quo* by the good Doctor for my finding himself and Mr. W. H. Edwards insufficiently citing Ochsenheimer, I don't think it a success. *Habet?* A. R. GROTE.

Rev. W. J. Holland, of Pittsburg, Pa., wishes to correspond with any one in Canada desiring to exchange Coleoptera or Lepidoptera.

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DEAR SIR: In a recent number of the CANADIAN ENTOMOLOGIST is a short note by Mr. J. Alston Moffat, part of which concerns two species of *Cyllene, pictus* and *robiniæ*. As there appears to be some difficulty in properly distinguishing these species, it is probable that a note in the ENTOMOLOGIST would assist in making more generally known the characters published by me a short time since (Trans. Am. Ent. Soc., 1880, p. 134, pl. ii., fig. 8).

If we examine the under side of the two species, noting the form of the prosternal process, it will be observed that this in *robiniæ* is nearly square, so that the front coxæ are moderately widely separated. The second joint of the hind tarsi is densely pubescent over its entire surface. The male antennæ are rarely longer than three fourths the length of the body, and but little if any stouter than those of the female. Generally the W-band nearly always joins the transverse band at the suture.

C. pictus, however, has a narrow prosternum, nearly twice as long as wide. The male antennæ are much stouter and at least a fourth longer than the body. The W-band rarely joins the transverse band. On the hind tarsi the second joint is nearly glabrous along its middle.

The two species differ also in habitat and time of appearance, *pictus* living in the hickory and appearing in early spring, while *robiniæ* bores the locust and appears in the autumn. Hoping these few notes will prove acceptable to your readers, I remain, yours truly,

Philadelphia, Dec., 1882. GEO. H. HORN.

A CORRECTION.

In the October (1879) number of the CANADIAN ENTOMOLOGIST appeared a short note by the writer on the larvæ of *Lachnosterna fusca*. These larvæ have, by subsequent rearing to the perfect state, proven to belong to *Allorhina (Gymnetis) nitida*. L. O. HOWARD.

DEAR SIR: I am satisfied from a recent examination of the imago reared from it, that the larval description on page 14, vol. 12 of CAN. ENT., should apply to *Agrotis Incivis* Guen., instead of to *A. Lubricans* Guen. G. H. FRENCH, Carbondale, Ills.

[Printed January 10, 1883.]

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